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of the  
**Asiatic Society of Bengal.**

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## CONTENTS.

	<i>Page</i>
PART I.	
Materials for a Flora of the Malayan Peninsula. No. 22.	
By J. Sykes Gamble .. .. .	1
PART II.	
Materials for a Flora of the Malayan Peninsula. No. 23.	
By J. Sykes Gamble .. .. .	205
PART III.	
Materials for a Flora of the Malayan Peninsula. No. 24.	
By J. Sykes Gamble .. .. .	279
PART IV.	
Materials for a Flora of the Malayan Peninsula. No. 25.	
By J. Sykes Gamble .. .. .	393
PART V.	
Materials for a Flora of the Malayan Peninsula. No. 26.	
By A. T. Gage .. .. .	469



# JOURNAL

OF THE

## ASIATIC SOCIETY OF BENGAL.

VOL. LXXV.

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*Materials for a Flora of the Malayan Peninsula* No. 22.—By J. SYKES  
GAMBLE, C.I.E., M.A., F.R.S., late of the Indian Forest  
Department.

FOUR volumes of this work, in 21 Parts, have already appeared, the first three containing the Thalamifloræ, Discifloræ and Calycifloræ, by Sir George King, K.C.I.E., LL.D., F.R.S.; the fourth containing Gamopetalæ by Sir George King and Mr. J. S. Gamble. The first two volumes were entirely Sir George King's own work; in the third volume the large Family of *Leguminosæ* was done by Lt.-Col. D. Prain, at that time Curator of the Herbarium, Royal Botanic Garden, Calcutta, the genus *Sonerila* in *Melastomaceæ* by Dr. O. Stapf of Kew, and the rest by Sir G. King. In the fourth volume, Lt.-Col. Prain also did *Convolvulaceæ*, *Solanaceæ*, *Scrophulariaceæ*, *Labiataæ* and a few other Families; the *Acanthaceæ* were done by the late Mr. C. B. Clarke, F.R.S.; and the *Gesneraceæ* were compiled from Mr. H. N. Ridley's work on that Family in the Journal of the Straits Branch of the Royal Asiatic Society. The other Families were done by either Sir G. King or Mr. Gamble.

The section of the 'Materials' dealing with the Monocotyledons appeared in 1907-8. It was a separate publication entitled "Materials for a Flora of the Malay Peninsula—Monocotyledons, by H. N. Ridley, M.A., F.R.S., etc., Director of Botanic Gardens, Singapore, S.S. (Methodist Publishing House, Singapore)," and really forms the concluding portion of this work.

This number is the first of Vol. V, which is intended to contain the Monochlamydeæ and the Gymnosperms; and, owing to the sad occurrence of the death of Sir George King which took place almost

on the very day that Part 21—the last one of Vol. IV—appeared, Mr. Gamble is alone responsible for it. He has been promised help by various Botanists, and especially by Major A. T. Gage, I.M.S., the present Superintendent of the Royal Botanic Garden, Calcutta; and hopes that with this kind assistance the whole work may soon be fully completed.

The present contribution contains the account of the Families No. 93 Nyctaginaceæ, No. 94 Amarantaceæ, No. 95 Polygonaceæ, No. 97 Aristolochiaceæ, No. 99 Chloranthaceæ, No. 102 Lauraceæ and No. 103 Hernandiaceæ, all the work of Mr. Gamble except No. 95 Polygonaceæ which has been contributed by Major Gage. The seven Families dealt with contain 33 genera and 189 species, of which 1 genus and 78 species were new. The new species have been published in the Kew Bulletin.

In accordance with the Rules adopted by the Vienna Conference, the measurements in this volume will be given in the metric system; and it is hoped that this change will not prove an inconvenience.

### Family XCIII.—NYCTAGINACEÆ.

Herbs, shrubs or trees. *Leaves* usually opposite, entire; stipules 0. *Flowers* hermaphrodite (rarely unisexual), regular, sometimes dimorphous; inflorescence various, the flowers often involucrate. *Perianth* monopetalous, petaloid, usually small; tube persistent, enveloping the fruit; limb 3—5-lobed, persistent or deciduous, the lobes plicate in bud. *Stamens* 1 to 30, hypogynous, sometimes unilateral; filaments usually unequal, inflexed in bud; anthers included or exserted, dorsifixed, didymous. *Ovary* free, 1-celled; ovule solitary, basal, erect; style filiform, involute in bud; stigma small. *Fruit* indehiscent, enclosed in the hardened perianth-tube. *Seed* erect; testa thin, adherent; albumen soft or floury; embryo with convolute or incurved cotyledons; radicle inferior.—DISTRIB. Genera about 22, species about 220, in tropical and warm regions.

#### I. BOERHAAVIA, Linn.

Herbs, erect or diffuse, often divaricately branched. *Leaves* opposite, often in unequal pairs. *Flowers* small, paniculate, umbellate or subcapitate, articulated with the pedicel; bracteoles small, often deciduous, rarely involucrate. *Perianth*-tube long or short, ovoid below, narrowed above the ovary; limb funnel-shaped or campanulate, 5-lobed. *Stamens* 1—5, connate below around the ovary.

exserted; filaments capillary, unequal. *Ovary* oblique, stipitate; ovule erect; stigma peltate. *Fruit* small, enclosed in the ovoid, turbinate or clavate, truncate, ribbed or angled, viscidly glandular perianth-tube; embryo conduplicate; cotyledons thin, broad, the outer the larger, enclosing the soft floury albumen; radicle long.—**DISTRIB.** About 30 species, tropical and subtropical.

**BOERHAAVIA DIFFUSA**, Linn. Sp. Pl. 3 (1753). A diffuse herb; root fusiform, stout; stems prostrate or ascending, divaricate, thickened at the nodes. *Leaves* opposite, in unequal pairs, ovate or orbicular-ovate, rounded or acute at apex, truncate or cordate or rounded only at base; upper surface rough, lower whitish scaly; larger one of each pair 2—3 cm. long, 1—2 cm. broad, smaller half the size or less; main nerves 3—5 pairs, spreading, the lowest pair near the base; petiole slender, variable in length, up to 2 cm. long. *Flowers* in subcapitate heads, in divaricate slender dichotomously branched terminal panicles; pedicels capillary; bracts small, lanceolate, acute. *Perianth* about 2 mm. long, the lower part of the tube about equalling the upper, the lower glandular enclosing the ovary, the upper glandular, dotted with red in 5 vertical bands, campanulate; lobes 5. *Stamens* 2, slightly exserted; the anthers glandular on the back. *Fruit* about 3 mm. long, obovate truncate, 5-ribbed and glandular. Bl. Bijdr. 733; Choisy in DC. Prod. XIII. 2. 452; Wall. Cat. 6770; Trimen Fl. Ceyl. III. 390; Cooke Bomb. Fl. II. 480. *B. procumbens*, Herb. Banks in Roxb. Fl. Ind. I. 146; Wight Ic. t. 874. *B. repens*, Linn. Sp. Pl. 3; Hook. f. Fl. Br. Ind. IV. 709; Choisy in DC. l. c. 453; Collett Fl. Siml. 410 t. 131; Prain Beng. Plants 862.—‘*Talu-Dama*’ Rheede Hort. Mal. VII. 105. t. 56.

**PENANG:** *Curtis!* *Deschamps!* **PROV. WELLESLEY:** *Ridley* 6983! **SINGAPORE:** *Lobb* 309!; *Ridley* 9131! a common weed of roadsides and cultivated fields.—**DISTRIB.** India, Ceylon, Malay Archipelago, tropical and subtropical Asia, Africa and America.

#### Family XCIV.—AMARANTACEÆ.

Herbs, rarely shrubs, erect or with climbing branches. *Leaves* opposite or alternate, exstipulate. *Flowers* usually hermaphrodite, rarely polygamous or dioecious, small, usually in terminal and axillary simple or paniced spikes, cymes or clusters, the outermost flowers of a cluster sometimes deformed; bracts hyaline or scarious; bracteoles 2, scarious. *Perianth* of usually 5 segments, free or slightly connate below, scarious or hyaline, persistent, imbricate,

nerved. *Stamens* 1—5, opposite the perianth segments; filaments free or connate below in a membranous hypogynous cup, often alternating with membranous staminodes; anthers dorsifixed, 1- or 2-celled. *Ovary* 1-celled, ovoid ellipsoid or globose; ovules 1 or more, amphitropous, erect or suspended from basal funicles; style sometimes simple or obsolete with capitate stigma, sometimes 2—3-fid with acute stigmas, or styles 2 or 3 papillosely stigmatic on the inner face, erect or recurved. *Fruit* a membranous utricle, rarely a berry or a capsule, breaking irregularly or circumscissily, supported by the persistent perianth. *Seed* erect or inverted, orbicular ovate or reniform, compressed; testa crustaceous; tegmen, if present, membranous; embryo horseshoe-shaped or annular, surrounding a floury albumen.—**DISTRIB.** Genera 48, species about 500, tropical and subtropical.

**Anthers 2-celled:—**

**Ovary 2— $\infty$ -ovuled; leaves alternate (Tribe I. CELOSIEÆ):—**

- |                                    |               |
|------------------------------------|---------------|
| Fruit a berry; shrubby .. ..       | 1. DEERINGIA. |
| Fruit membranous; herbaceous .. .. | 2. CELOSIA.   |

**Ovary 1-ovuled (Tribe II. AMARANTEÆ):—**

**Ovule erect; leaves alternate:—**

- |   |               |
|---|---------------|
| Flowers 2-sexual, capitate; utricle circumsciss ..                          | 3. ALLMANIA.  |
| Flowers unisexual, in large clusters; utricle circumsciss or indehiscent .. | 4. AMARANTUS. |

**Ovule suspended from a basal funicle; leaves opposite:—**

Flowers clustered, 1—3 perfect, surrounded by deformed ones:—

- |                                       |              |
|---------------------------------------|--------------|
| Stamens with interposed staminodes .. | 5. CYATHULA. |
| Stamens without staminodes ..         | 6. PUPALIA.  |

**Flowers all perfect:—**

- |  |                  |
|--|------------------|
| Staminodes 0; spikes short; perianth-segments soft .. .. | 7. PSILOTRICHUM. |
|--|------------------|

**Staminodes present:**

Spikes rather short; perianth-segments soft, often woolly .. ..

- |  |                 |
|--|-----------------|
| Spikes long; perianth-segments spinescent .. | 8. ABRUA.       |
|  | 9. ACHYRANTHES. |

**Anthers 1-celled; ovary 1-ovuled; ovule suspended from a basal funicle; leaves opposite (Tribe III. GOMPHRENEÆ):—**

- |       |                    |
|-------|--------------------|
| .. .. | 10. ALTERNANTHERA. |
|-------|--------------------|

The following plants seem to be commonly cultivated in gardens, besides some of these described.

*Telanthera ficoidea*, Moq. in DC. Prodr. xiii. 2. 363 (1849), a native of Brazil and used for edgings and carpet borders, the leaves being of a fine crimson colour.

SINGAPORE: *Deschamps*!

*Gomphrena globosa*, Linn. Sp. Pl. 224 (1753) the 'Globe Amaranth' probably coming from America, with large globose yellow or crimson heads of flowers. Hook. f. Fl. Br. Ind. IV. 732.

SINGAPORE: *T. Anderson* 80!

### 1. DEERINGIA, Brown.

Herbs or rambling or climbing shrubs. *Leaves* alternate, petiolate, entire. *Flowers* 1—2-sexual, small, in simple or paniced spikes or racemes, or sometimes fascicled; bract and 2 bracteoles scarious. *Perianth*-lobes 5, oblong, imbricate, spreading in fruit, subequal. *Stamens* 4—5, the filaments broadened and connate at the base in a cup, slender above; anthers reniform-oblong, 2-celled. *Ovary* ovoid or subglobose; stigmas 2—4, subulate; ovules few or many, on long funicles from the base. *Fruit* a globose berry or circumsciss utricule, seated on the spreading persistent perianth. *Seeds* few or many, reniform, compressed; testa crustaceous, puncticulate; embryo annular, surrounding the farinaceous albumen; cotyledons linear, plano-convex; radicle descending. **DISTRIB.** Species 5—6, Asiatic, Australian and Pacific, one in Madagascar.

Flowers, in long paniced racemes; stamens exsert;

seeds few, under 6 .. .. 1. *D. celosioides*.

Flowers, in short spikes; stamens scarcely exsert; seeds

very many .. .. 2. *D. indica*.

1. *DEERINGIA CELOSIoides*, Brown Prodr. Fl. Nov.-Holl. I. 413 (1810). A woody climbing shrub; branchlets long, slender, climbing, blackish when dry. *Leaves* membranous, glabrous, ovate or ovate-lanceolate, acuminate at apex, rounded or deltoid-acute, sometimes cordate, often unequal at base; upper surface blackish when dry, lower pale; 5—10 cm. long, 4—5 cm. broad but often less; midrib slender, main nerves 7—10 pairs, branching, prominent beneath and joined by irregular transverse nervules; petiole slender, 1—2.5 cm. long. *Flowers* small, in long slender racemes in terminal drooping panicles often 30—40 cm. long; bract and 2 bracteoles ovate acuminate, scarious. *Perianth*-lobes oblong, obtuse, 1—1.5 mm. long, scarious on the margins. *Stamens* exsert; anthers oblong-reniform. *Ovary* depressed globose; stigmas 3, papillose. *Fruit* a succulent scarlet berry about 5 mm. in diam.; pericarp rather thin; seeds about 3—6, black, puncticulate. Roxb. Fl. Ind. I. 682 and ed. Carey and Wall. II. 511; Wight Ic. t. 728; Wall. Cat. 6888; Dalz. & Gibs. Bomb. Fl.

214; Bot. Mag. t. 2717; Endl. Iconog. t. 62; Miq. Fl. Ind. Bat. I. 1. 1025; Benth. Fl. Austral. V. 209; Baill. Hist. des Pl. IX. 157. t. 230, 231; Hook. f. Fl. Br. Ind. IV. 714; Collett Fl. Siml. 412; Brandis Ind. Trees 518; Prain Beng. Plants 866; *D. baccata*, Moq. in DC. Prodr. XIII. 2. 236; Engl. & Prantl Naturl. Pflanzenfam. III. 1a. 97. t. 49. *D. indica*, Retz in Bl. Bijdr. 542; *Cladostachys frutescens*, Don Prodr. Fl. Nep. 76; Miq. l. c. excl. syn. *Blitum frutescens*, Rumph. Herb. Amb. V. 235 t. 83, fig. 2.

PERAK: at Batu Kuran, *Scortechini* 1593! DISTRIB. India, Burma, Malay Islands, China, Australia.

2. *DEERINGIA INDICA*, Zoll. Syst. Verz. Pl. Jav. 110 (1854). A herbaceous shrub, reaching 1 to 1.5 m. in height; branchlets rather fleshy, angled when dry, glabrous. *Leaves* membranous; lanceolate or elliptic-lanceolate, acuminate at apex, cuneate-acuminate at base; glabrous on both surfaces, pale beneath when dry; 10–20 cm. long, 5–8 cm. broad; midrib rather broad; main nerves 8–11 pairs, the lowest pair rather oblique, the rest nearly at right angles to the midrib, curved near the margin; secondary nerves few; transverse nervules irregular, obscure; petiole slender, 1.5 to 2, sometimes to 4 cm. long. *Flowers* in short axillary glabrous spikes 1–4 cm. long; bract and bracteoles ovate, acute or obtuse, scarious. *Perianth* lobes oblong, acute, concave, scarious on the margins, 2.5–3 mm. long. *Stamens* scarcely exsert; filaments filiform above, gradually broadening to join in a cup 1 mm. long; anthers oblong-reniform. *Ovary* subglobose; stigmas 3, spreading, papillose. *Fruit* a white subglobose berry about 5 mm. in diam.; pericarp thick, fleshy; seeds many (up to 50), angular-reniform, beaked, black, punctulate. Moq. in DC. Prodr. XIII. 2, 236; Miq. Fl. Ind. Bat. I. 1026.

PERAK: at Kwala Dipang, *Ridley* 9583! *Scortechini*! at Waterloo, *Curtis* 2691! near Goping, Larut, on limestone at 150–300 m. alt. *King's Collector* 4611! DISTRIB. Java, the Moluccas and Philippine Islands.

## 2. CELOSIA, Linn.

Herbs or rarely shrubs, erect or with climbing branches. *Leaves* alternate. *Flowers* hermaphrodite, in dense terminal and axillary spikes, white or pink, shining; bract and bracteoles scarious. *Perianth*-lobes 5, slightly connate below, scarious, imbricate, oblong or lanceolate, acute or obtuse, longitudinally nerved, erect in fruit. *Stamens* 5; filaments slender, connate below in a membranous hypogynous cup; anthers 2-celled, dorsifixed. *Ovary* 1-celled, ovoid or sub-



globose; ovules 2 or more on long funicles from the base of the ovary; style 0 or short or long, and sometimes elongating after flowering; stigma simple or 2—3, subulate. *Fruit* a utricle dehiscing in circumsciss fashion near the middle, membranous or sometimes coriaceous. *Seeds* 2 or more, erect, lenticular; testa crustaceous, black, shining or dull; embryo annular, surrounding the floury albumen; cotyledons linear; radicle descending or ascending. **DISTRIB.** About 35 species in tropical Asia, Africa and America.

1. *CELOSIA ARGENTEA*, Linn. Sp. Pl. 205 (1753). A glabrous annual herb, reaching 30 cm. to 1 m. in height; stem erect, branches grooved. *Leaves* variable, linear or linear-lanceolate, acuminate at apex and at base, glabrous, entire, 2—10 cm. long, 5—25 mm. broad; nerves irregular; petiole 0 or very short and slender. *Flowers* in dense terminal cylindric spikes, 3 to 25 or more cm. long, at first pink then becoming shining white, sometimes branching at the apex cockscomb-fashion; bract and bracteoles lanceolate, acuminate or awned, scarious, 4—5 mm. long. *Perianth*-lobes linear-lanceolate, sharply acuminate, scarious, about 8 mm. long, 3-nerved. *Stamens* with slender filaments about 3 mm. long, combined below in a cup 2 mm. deep; anthers linear, 1—1.5 mm. long, the bases finally divaricate. *Ovary* ovoid, very thin; style slender, 5 mm. long; stigma small. *Utricle* 3—4 mm. long, ellipsoid, tapering into the persistent style, circumsciss about the middle. *Seeds* 4—8, lenticular, more or less compressed, 1—5 mm. in diam.; testa black, shining. Willd. Sp. Pl. I. 1197; Roxb. Fl. Ind. I. 678 and ed. Carey & Wall. II. 507; Dalz. and Gibs. Bomb. Fl. 215; Wight Ic. t. 1767; Wall. Cat. 6916; Bl. Bijdr. 543; Miq. Fl. Ind. Bat. I. 1. 1028; Moq. in DC. Prodr. XIII. 2. 242; Hook. f. in Fl. Br. Ind. IV. 714; Trimen Fl. Ceyl. III. 393; Cooke Bomb. Fl. II. 486; Prain Beng. Plants 867; Engl. & Prantl Naturl. Pflanzenfam. III. 1.a. 99, t. 51. *C. margaritacea*, Linn. l.c.; Wall. Cat. 6917; Don Prodr. Fl. Nep. 76; Baill. Hist. des Pl. IX. 157 tt. 228, 229. 'Belutta-adeca-manjen' Rheede Hort. Mal. X. 75, 77. tt. 38, 39.

**PERAK**: river Pluss, Wray 45! **PAHANG**: at Temerloh, Ridley 2253! **MALACCA**?: Griffith 4181-2! **DISTRIB.** Throughout India, Ceylon, Tropical Asia, Africa, America: in fields, native country unknown.

### 3. *ALLMANIA*, Brown.

Erect or diffuse herbs. *Leaves* alternate; linear, 'obovate or spatulate, entire. *Flowers* hermaphrodite, in terminal and axillary,

sessile or pedunculate, globose or ovoid heads; bract 1, bracteoles 2, scarious. *Perianth*-segments 5, equal, imbricate, free or nearly so, scarious, oblong-lanceolate, nerved, erect in fruit. *Stamens* 5, united below in a membranous hypogynous cup; filaments slender; anthers small, 2-celled, dorsifixed. *Ovary* ovoid, 1-celled, narrowed into a long straight style; stigma capitate, 2-lobed; ovule solitary, erect. *Fruit* a subglobose or ovoid circumsciss membranous utricle. *Seed* 1, orbicular, flattened; testa crustaceous, black, with a basal cup-shaped aril; embryo annular, surrounding copious mealy albumen; cotyledons linear; radicle inferior. **DISTRIB.** About 3 species, in Tropical Asia.

1. *ALLMANIA NODIFLORA*, Br. in Wall. Cat. 6890 (1828). A diffuse annual (or sometimes perennial?) herb; branchlets angular, dichotomously divaricate, pale when dry, glabrous or slightly puberulous. *Leaves* variable, linear-lanceolate to oblong or spatulate, often mucronate at apex; petiole 0 or slender. *Flowers* in globose sessile or shortly pedunculate axillary white or brown heads 10—15 mm. in diameter; bract linear-lanceolate, 4—5 mm. long, bracteoles similar, rather shorter, keeled. *Perianth*-lobes oblong-lanceolate, acuminate, 5 mm. long, strongly 1-nerved, shortly connate at the base. *Ovary* ovoid, membranous; style 1.5 mm. long; stigma small, capitate, very shortly 2-lobed. *Utricle* membranous, hyaline. *Seed* large, nearly as large as the utricle, orbicular, flattened; aril cup-shaped, 2-lobed. Hook. f. Fl. Br. Ind. IV. 717; Cooke Bomb. Fl. II. 487; Prain Beng. Plants 867; Engl. & Prantl Naturl. Pflanzenfam. III. 1a. 102, t. 55. *Celosia nodiflora*, Linn. Sp. Pl. 298. *Achyranthes nodiflora*, Roxb. Fl. Ind. I. 678. *Chamissoa nodiflora*, Mart.; Moq. in DC. Prodr. XIII. 2. 249; Miq. Fl. Ind. Bat. I. 1. 1029. *C. aspera*, Wight Ic. t. 1772. *C. dichotoma*, Wight Ic. t. 1771.

**DISTRIB.** India, Ceylon, Malay Peninsula and Archipelago, China.

**VAR. *esculenta***, Hook. f. *Leaves* very narrow linear, 3—5 cm. long. *A. esculenta*, Br. in Wall. Cat. 6892; Moq. l.c. 249.

**MALACCA:** Griffith 4182! *Cuming* 2297! **PAHANG:** *Ridley* 1409! **SINGAPORE:** *Ridley* 9493!

**VAR. *procumbens***, Hook. f. *Leaves* spatulate or oblanceolate, 3—3.5 cm. long, 10—12 mm. broad. Wall. Cat. 6980 E in part. *A. nodiflora*, Wight Ic. t. 1770.

**SINGAPORE:** *Ridley* 3381!

## 4. AMARANTUS, Linn.

Annual herbs. *Leaves* alternate, petiolate, usually entire. *Flowers* small, monœcious or polygamous, in cymules of three or more, arranged in axillary clusters or dense terminal and axillary spikes or panicles; bract 1, bracteoles 2. *Perianth* of 3 or 5 membranous equal or subequal segments; in ♂ ovate-lanceolate, in ♀ oblong or spatulate. *Stamens* 5 or less, free; anthers 2-celled; staminodes 0. *Ovary* compressed, ovoid, 1-celled; style short or 0; stigmas 2—3, filiform or subulate; ovule 1, erect. *Fruit* an orbicular or ovoid compressed utricle, indehiscent or circumsciss. *Seed* erect, orbicular, compressed; testa crustaceous; embryo annular, enclosing floury albumen; cotyledons linear; radicle inferior. **DISTRIB.** Several species, of which some cultivated; tropical or subtropical.

Perianth-lobes and stamens 5 each; utricle circumsciss:

- |                                |                         |
|--------------------------------|-------------------------|
| Leaf axils spinous .. .. .     | 1. <i>A. spinosus</i> . |
| Leaf axils not spinous .. .. . | 2. <i>A. caudatus</i> . |

Perianth-lobes and stamens 3 each; no spines:

- |   |                           |
|---|---------------------------|
| Utricle circumsciss; perianth-lobes, bracts and bracteoles long-awned .. .. .     | 3. <i>A. gangeticus</i> . |
| Utricle indehiscent; perianth-lobes, bracts and bracteoles shortly-awned, .. .. . | 4. <i>A. viridis</i> .    |

1. AMARANTUS SPINOSUS, Linn. Sp. Pl. 991 (1753). An erect glabrous herb. 30–60 cm. high; stems hard, often reddish, with many grooved branches and usually sharp divaricate spines usually in pairs at the leaf axils, 15 mm. long or less. *Leaves* membranous; ovate or oblong, obtuse and sharply mucronate at apex, cuneate at base, glabrous above, sometimes scurfy beneath; 3–8 cm. long, 1–4 cm. broad; main nerves numerous, about 10 pairs, slender, prominent beneath; petiole slender, 1–6 cm. long. *Flowers* very numerous, in cymules of 3 or more in dense axillary clusters and in terminal and axillary dense or interrupted spikes, the upper flower in the spikes usually ♂, the lower ♀ or the ♂ and ♀ mixed; bracts and bracteoles linear-lanceolate, sharply mucronate. *Perianth*-lobes 5: in ♂ ovate-lanceolate, 1-ribbed, scarious, mucronate, 2–3 mm. long; in ♀ shorter, obovate or spatulate. *Stamens* 5; anthers oblong; filaments flattened. *Ovary* ovoid; stigmas 2–3, subulate. *Utricle* circumsciss about the middle, membranous, rugose. *Seed* about 1 mm. in diam.; testa black, shining. Moq. in DC. Prodr. XIII. 2. 260; Willd. Hist. Amarant. 38. t. 4. fig. 8; Roxb. Fl. Ind. III. 611; Dalz. and Gibs. Bomb. Fl. 216; Wight Ic. t. 513; Wall. Cat. 6894; Bl. Bijdr. 540; Miq. Fl. Ind. Bat. I. i. 1031; Hook. f. Fl. Br. Ind.

IV. 718; Trimen Fl. Ceyl. III. 396; Cooke Bomb. Fl. II. 489; Prain Beng. Plants 869.

PENANG: road sides and waste places, *Deschamps*! PROVINCE WELLESLEY: at Krian, *Ridley* 9419! MALACCA: *Griffith* '4183 B! SINGAPORE: *Ridley* 8920! DISTRIB. India, Ceylon, Malay Archipelago, etc.

2. *AMARANTUS CAUDATUS*, Linn. Sp. Pl. 990 (1753). An erect glabrous herb; stems striate. *Leaves* membranous; elliptic, or ovate-lanceolate, obtuse at apex, cuneate at base; both surfaces glabrous, often dotted; 3–7 cm. long, 2–4 cm. broad; main nerves 8–10 pairs, prominent beneath; petiole slender 3–5 cm. long. *Flowers* very numerous, in cymes in dense clusters axillary or along the rachis of terminal or axillary drooping spikes 10–20 cm. long; bracts obovate, sharply long mucronate. *Perianth*-lobes 5, oblanceolate, mucronate, keeled. *Stamens* 5; anthers oblong. *Ovary* ovoid; stigmas 2–3, often thick. *Utricle* circumsciss about the middle, membranous, rugose. *Seed* about 1 mm. in diam.; testa black, shining. Moq. in DC. Prodr. XIII. 2. 255; Wall. Cat. 6907; Willd. Hist. Amarant. 36; Hook. f. Fl. Br. Ind. IV. 719; Prain Beng. Plants 870. *A. cruentus*, Willd.; Roxb. Fl. Ind. III. 610. *A. caudatus* and *A. Alopecurus*, Hochst.

SINGAPORE: *Ridley* 9100!, 10403! 10443! apparently a garden weed; *Deschamps*! DISTRIB. cultivated and run wild in most tropical countries.

This seems to be merely a small weedy form of *A. caudatus* and except for the absence of spines comes very close to *A. spinosus*.

3. *AMARANTUS GANGETICUS*, Linn. Syst. Nat. ed. 10, 1268 (1759). An erect glabrous herb, 60–120 cm. high; stem stout, branching, grooved. *Leaves* membranous, lanceolate, ovate, rhomboid-ovate or deltoid-ovate, obtusely acute and mucronate at apex, rounded and then acuminate at base and decurrent on the petiole; both surfaces glabrous, white-dotted when dry; 5–15 cm. long, 2–10 cm. broad; main nerves about 10 pairs, prominent; petiole slender, 2–8 cm. long, the upper half bordered by the decurrent margins of the blade. *Flowers* very numerous, in cymes clustered in the axils of the leaves and also forming a long terminal more or less interrupted spike, the ♂ and ♀ mixed; bract ovate, scarious, with a long slender awn 4 mm. long; the bracteoles rather shorter, less awned. *Perianth*-lobes 3, lanceolate, long-awned, up to 4 mm. long, those of ♂ shorter and less awned. *Stamens* 3; anthers oblong; filaments slender. *Ovary* ovoid; stigmas 3, subulate. *Utricle* circumsciss about the

middle, membranous, rugose. *Seed* 1—1.5 mm. in diam., flattened; testa shining, black. Willd. Hist. Amarant. t. 6, f. 11; Roxb. Fl. Ind. III. 606; Wall. Cat. 6896 *excl. C.*; Moq. in DC. Prodr. XIII. 2. 261; Miq. Fl. Ind. Bat. I. 1. 1033; Hook. f. Fl. Br. Ind. IV. 719; Trimen Fl. Ceyl. III. 396; Cooke Bomb. Fl. II. 489; Prain Beng. Plants 870. *A. tricolor*, Willd. Sp. Pl. IV. 383; Roxb. l. c. 608; Wall. Cat. 6902. *A. lanceolatus*, Roxb. l. c. 604; Wall. Cat. 6895. *A. tristis*, Willd. l. c. 385; Roxb. l. c. 604; Wall. Cat. 6904, A. C.; Wight Ic. t. 713. Dalz. and Gibs. Bomb. Fl. 215. *A. oleraceus*, Willd. l. c. 386; Roxb. l. c. 605; Wight Ic. t. 715. *A. polygamus*, Willd. l. c. 384; Roxb. l. c. 603; Wall. Cat. 6899 *excl. D.*; Wight Ic. t. 714. *A. lividus*, Willd. l. c. 536; Roxb. l. c. 605; Wall. Cat. 6896 C. *A. melancholicus*, Willd. l. c. 383; Roxb. l. c. 608.

PENANG: about George Town, *Deschamps*! SINGAPORE: Macpherson road, *Ridley* 6256! DISTRIB. Tropical regions, cultivated.

4. AMARANTUS VIRIDIS, Linn. Sp. Pl. Ed. 2. 1405 (1763). An erect branching glabrous herb 30—60 cm. high, the branches grooved, often reddish. *Leaves* membranous, ovate or deltoid-ovate, obtuse and usually notched at apex, cuneate or truncate at base; both surfaces more or less white-dotted when dry; 2—8 cm. long, 1—5 cm. broad; main nerves about 6 pairs, slender; petiole slender, 1—6 cm. long. *Flowers* shortly pedicelled, in small cymules in axillary clusters and in terminal and axillary slender more or less interrupted paniculate racemes; bract and bracteoles ovate, acute, green-keeled, shorter than the perianth-lobes. *Perianth-lobes* 3, in ♂ ovate-acuminate, in ♀ obovate, mucronate, membranous, green-keeled, 1—1.5 mm. long. *Stamens* 3; anthers linear-oblong; filaments short, slender. *Ovary* oblong-obovate; style thick; stigmas 2—3, subulate. *Utricle* suborbicular, indehiscent, membranous, rugose, 1.5 mm. in diam., surmounted by the persistent style. *Seed* lenticular, smooth, shining, black, 1 mm. in diam. Roxb. Fl. Ind. III. 605; Hook. f. Fl. Br. Ind. IV. 720; Trimen Fl. Ceyl. III. 397; Cooke Bomb. Fl. II. 490; Prain Beng. Plants 871. *A. polystachyus*, Ham. in Wall. Cat. 6901. *A. fasciatus*, Roxb. l. c. 609; Wight Ic. t. 717. *Euxolus caudatus*, Moq. in DC. Prodr. XIII. 2. 274; Wight Ic. t. 1773; Miq. Fl. Ind. Bat I. i. 1035.

MALACCA: *Griffith*! SINGAPORE: *Kurz*! *Hullett* 241! *Ridley* 4690! *Deschamps*!—DISTRIB. All tropical and warm countries, a weed of cultivation.

#### 5. CYATHULA, Lour.

Herbs or undershrubs. *Leaves* opposite, petiolate, entire.

*Flowers* small, hermaphrodite, in large or small, bracteate and bracteolate, spicate or capitate clusters; perfect flowers 1—3 in each cluster, surrounded by imperfect ones. *Perianth*-segments 5, scarious, 1-nerved, acuminate or with hooked rigid awns; in the imperfect flowers reduced to hooked rigid awns. *Stamens* 5; filaments connate below with intervening lacerate or 2—3-fid staminodes into a hypogynous membranous cup; anthers 2-celled. *Ovary* obovoid, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, filiform; stigma capitellate. *Fruit* an ovoid membranous utricle enclosed in the perianth, its apex areolate. *Seed* inverse, oblong; testa coriaceous, tegmen membranous; embryo annular; cotyledons linear-oblong, flat, surrounding the farinaceous albumen; radicle erect.—**DISTRIB.** About 10 species in tropical and subtemperate Asia, Africa and America.

1. *CYATHULA PROSTRATA*, Blume Bijdr. 549 (1825). A slender annual herb, prostrate below, erect above, thickened and rooting at the lower nodes; stem angular, glabrous or scaberulous, trichotomously branched above, upper branchlets and rachis densely hispid-tomentose. *Leaves* elliptic-rhomboid or ovate, acute at apex, cuneate at base; both surfaces strigosely hispid, lower often reddish; 2—6 cm. long, 1—3 cm. broad; main nerves 4—6 pair, prominent; petiole very short, sometimes 0. *Flowers* pale violet, in small drooping clusters arranged in terminal spicate pedunculate racemes 10—15 cm. long; pedicels very short; bract and bracteoles ovate, acuminate, hispid-pubescent. *Perianth*-lobes of the 2—3 perfect flowers 5, lanceolate, acuminate, 3-nerved, hispid, 2—2.5 mm. long; those of imperfect flowers similar or reduced to hooked awns. *Stamens* 5 with slender filaments and minute orbicular anthers, alternating with short bifid staminodes and forming below a hyaline cup. *Ovary* obovoid, glabrous; style slender; stigma capitellate. *Utricle* thinly membranous, ovoid, surmounted by the remains of the style. *Seed* 1—1.5 mm. long, oblong-ellipsoid, testa smooth, shining; cotyledons oblong, flat. Moq. in DC. Prodr. XIII. 2. 326; Dalz. and Gibs. Bomb. Fl. 219; Hook. f. Fl. Br. Ind. IV. 723; Trimen Fl. Ceyl. III. 398; Cooke Bomb. Fl. II. 496; Prain Beng. Plants 872. *C. repens*, Moq. l. c. 330. *C. geniculata*, Lour. Fl. Cochinch. I. 112; Miq. Fl. Ind. Bat. I. 1. 1045. *Achyranthes prostrata*, Linn. Sp. Pl. Ed. 2. 296; Roxb. Fl. Ind. I. 674 and Ed. Carey and Wall. II. 501. *Desmochæta prostrata*, DC. Cat. Hort. Monsp. 102; Wight Ic. t. 733. *D. patula*? Wall. Cat. 6937; *D. repens*, Roem. and Sch. Syst. V. 552; Wall. Cat. 6938. 'Scheru-cadelari' Rheede Hort. Mal X. 157. t. 79.



PENANG: *Curtis* 17! 944! *Deschamps*! MALACCA: *Griffith*! *G. King*! *Harvey*! *Hullett*! PERAK: *Scortechini*!; at *Jenah*, etc., *Wray* 1754! 3489! 3494! JOHORE: at *Kota Tingji*, *Ridley* 5726!—DISTRIB. India, Ceylon, Malay Archipelago (*Java*, *Forbes* 535! *Sumatra*, *Forbes* 1242!) and through the tropics of the World.

#### 6. PUPALIA, Juss.

Herbs or undershrubs. *Leaves* opposite, petiolate, entire. *Flowers* green, hermaphrodite, fascicled in simple or paniculate spikes, fascicles with 1—2 perfect flowers, the rest imperfect; bract and bracteoles scarious, awned. *Perianth*-segments of perfect flowers 5, nearly equal, lanceolate, acuminate, 3—5-nerved; those of imperfect flowers reduced to awns with spreading hooked bristles. *Stamens* 5; filaments slender, subulate, shortly combined at the base; anthers 2-celled; staminodes 0. *Ovary* ovoid, 1-celled; ovule 1, pendulous from a long basal funicle; style simple; stigma capitate. *Fruit* an ovoid membranous compressed utricle, enclosed in the perianth, the top areolate. *Seed* inverse, lenticular, rostellate; testa thinly crustaceous; tegmen membranous; embryo annular; cotyledons linear-oblong, flat, surrounding the farinaceous albumen; radicle ascending.—DISTRIB: Species 5, Asiatic and African.

1. PUPALIA ATROPURPUREA, Moq. in DC. Prodr. XIII. 2. 331 (1849). A slender, erect, annual or biennial, herb reaching 60 to 150 cm. in height; branches long, straggling or semi-scandent; glabrous, often tinged with purple. *Leaves* membranous, ovate or elliptic-lanceolate, acuminate and mucronate at apex, suddenly contracted at base; both surfaces glabrous or nearly so, white-punctulate when dry; 2—10 cm. long, 1—5 cm. broad; main nerves distant, about 6 pair; petiole slender, 6—18 mm. long. *Flowers* in sessile clusters in lax-pedunculate terminal spikes, up to 25 cm. long; bracts small, ovate; acuminate, persistent on the rachis; bracteoles 2, larger, ovate, strongly keeled and mucronate, 4 mm. long, deciduous with the flower cluster. *Perianth*-segments 5, ovate-lanceolate, mucronate, 4 mm. long, lanate, 3—5-nerved; those of imperfect flowers reduced to glochidiate purple hooked awns. *Stamens* 5; anthers suborbicular, minute; filaments slender, very thin, joined at base in a shallow hyaline cup. *Ovary* obovate; style slender, persistent in fruit. *Utricle* very thin. *Seed* oblong, 1—2 mm. long, truncate at both ends; testa black, crustaceous; tegmen membranous; cotyledons short; radicle thick and long. Dalz. and Gibs. Bomb. Fl. 219; Miq. Fl.

Ind. Bat. I. 1046; Hook. f. Fl. Br. Ind. IV. 723; Trimen Fl. Ceyl. III. 399; Cooke, Bomb. Fl. II. 497; Prain Beng. Plants 872. *Achyranthes lappacea*, Linn. Sp. Pl. Ed. 2. 95, *excl. Syn. Ed. 1*; Roxb. Fl. Ind. I. 673, and Ed. Carey and Wall. II. 500. *A. atropurpurea*, Lamk. Dict. I. 546. *Desmochæta atropurpurea*, DC. Cat. Hort. Monsp. 102; Wall. Cat 6933 *excl. K*; Wight Ic. t. 731. 'Wellia Codiveli' Rheede Hort. Mal. X. 117 t. 59.

SINGAPORE AND PENANG: *Wallich*.—DISTRIB. India, Ceylon, Java, Madagascar, etc.

#### 7. PSILOTRICHUM, Blume.

Herbs or undershrubs, 3-chotomously branched. *Leaves* opposite, petiolate, entire. *Flowers* white or greenish, hermaphrodite, in axillary solitary or paniced spikes or clusters; bracts small, chaffy; bracteoles 2, small. *Perianth*-segments 5, slightly connate below, ovate, acuminate, ribbed. *Stamens* 5; filaments unequal, slender, connate below in a thin cup; anthers 2-celled; staminodes 0. *Ovary* oblong or subglobose; style slender; stigma capitellate or 2-fid; ovule 1, pendulous from a long basal funicle. *Fruit* a globose or compressed utricle, enclosed in the hardened perianth. *Seed* inverse, lenticular; testa coriaceous or crustaceous; embryo annular, enclosing the floury albumen; cotyledons thin, flat; radicle ascending.—DISTRIB. Species 10—12, Asiatic, African or Pacific.

1. PSILOTRICHUM TRICHOTOMUM, Blume Bijdr. 545 (1826). A flaccid decumbent subglabrous annual herb 30—40 cm. high; branches erect, striate; nodes hairy. *Leaves* membranous; elliptic, elliptic-lanceolate or lanceolate, rarely obovate, acute at apex, narrowed at base, very pale when dry; 2—6 cm. long, 5—15 mm. broad; main nerves 2—3 pair, oblique, obscure; petiole very short or 0. *Spikes* green, terminal, 5—15 mm. long; flowers reddish, crowded; bract chaffy, persistent on the pubescent rachis; bracteoles minute, deciduous with the flower. *Perianth*-lobes equal, hard, lanceolate, acuminate, glabrous, 3—5-nerved, 2 mm. long, persistent around the fruit. *Stamens* very small; anthers suborbicular; filaments very thin. *Ovary* globose; style short; stigma capitate. *Utricle* membranous. *Seed* small; testa black, shining. Moq. in DC. Prodr. XIII. 1. 280; Hook. f. Fl. Br. Ind. IV. 725. *Achyranthes? carnosa*, Wall. Cat. 6931. *Leiospermum ferrugineum*, Wight Ic. t. 721. *Ptilotus trichotomus*, Miq. Fl. Ind. Bat. I. 1. 1037.

PERAK: in open ground on mountains at 250—300 m., *King's*



Collector 10732!—DISTRIB. India, Burma, Java, Sumatra (Lampor, 180 m. Forbes 2650 !), Borneo, Philippines.

*AERUA*, Forsk.

Herbs or undershrubs, more or less woolly. *Leaves* alternate or opposite. *Flowers* hermaphrodite or polygamous, in simple or paniced spikes; bract and 2 bracteoles small. *Perianth* 5-(rarely 4-) lobed, lobes equal or the outer broader, usually more or less woolly. *Stamens* 5, connate with short or long intervening staminodes in a short hypogynous cup; anthers 2-celled. *Ovary* ovoid or subglobose, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, short or long; stigma capitellate. *Fruit* a membranous utricle or circumsciss capsule with coriaceous crown. *Seed* inverse; testa coriaceous; *Embryo* annular, surrounding floury albumen; cotyledons linear; radicle inferior.—DISTRIB. Tropical Africa and Asia, species about 15.

1. *AERUA CURTISII*, Oliv. in Hook. Ic. Plant. t. 2201 (1892). A straggling undershrub or herb apparently perennial; branchlets pale, crispate-pubescent, grooved when dry. *Leaves* opposite, membranous; lanceolate, acuminate at apex, acuminate and long decurrent on the petiole at the base; upper surface puberulous at length glabrous, lower softly pubescent with whitish hairs, at length nearly glabrous; 6—12 cm. long, 2—5 cm. broad; midrib slender; main nerves 6 pairs, oblique; transverse nervules and reticulations obscure; petiole slender, 1—2 cm. long. *Flowers* in spikes, 2—4 cm. long in axillary subumbellate panicles or fascicles on a slender peduncle 1—3 cm. long; bract and 2 bracteoles ovate acuminate, 1 mm. long, the former persistent after the fall of the fruit with the bracteoles and perianth; rachis softly strigosely pubescent. *Perianth*-lobes ovate-oblong, acute, white, scarious, 5—7-nerved, 2—3 mm. long. *Stamens* small, the cup and staminodes hyaline, the filaments deltoid-subulate; anthers suborbicular. *Ovary* membranous, subglobose; style short; stigma capitate; ovule pendulous on a long funicle. *Utricle* membranous. *Seed* deeply and obliquely reniform, 2 mm. in diam.; testa black, minutely puncticulate.

PERAK: bottom of Waterloo Estate, Curtis 2712! *Scortechini*! on rocks in Upper Perak, at 90 m. alt., Wray 3698!

This species has not much the appearance of a species of *Aerua*; it more nearly resembles a *Psilotrichum* as I at first believed it to be. The presence, however, of antherless filaments between the stamens requires it to be described in *Aerua*.

## 8. ACHYRANTHES, Linn.

Herbs, sometimes woody below. *Leaves* opposite, petiolate, entire. *Flowers* hermaphrodite, in slender simple and paniced spikes, soon deflexed; bracts membranous, spinescent, persistent on the rachis; bracteoles 2, spinescent. *Perianth* segments 5, lanceolate, aristate, rigid, somewhat connate below, ultimately ribbed and hardened. *Stamens* 2—5; filaments filiform, connate at the membranous base and alternating with as many square staminodes which are toothed lacerate or with a toothed scale at the back; anthers 2-celled. *Ovary* oblong, subcompressed, 1-celled; ovule solitary, pendulous from a long basal funicle; style filiform; stigma capitellate. *Fruit* an oblong or ovoid utricle, apex rounded or areolate. *Seed* inverse, oblong; testa coriaceous, tegmen membranous; embryo annular, surrounding the floury albumen; cotyledons oblong-lanceolate, incurved again; radicle erect.—DISTRIB. About 15 species, tropical and subtropical.

1. ACHYRANTHES ASPERA, Linn. Sp. Pl. 204 (1753). An erect undershrub reaching 30—90 cm. in height; stem stout and woody at base, the nodes swollen; branches few, terete or obscurely quadrangular, pubescent, striate. *Leaves* extremely variable, thick, elliptic or obovate sometimes nearly orbicular, rounded or subacute at apex, narrowed at base; both surfaces softly pubescent; 3·5—6 cm. long, 2·5—4 cm. broad; main nerves 3—4 pair, obscure; petiole 6—8 mm. long. *Flowers* greenish-white, numerous, stiffly deflexed against the woolly rachis, in elongate terminal lengthening spikes, often 50 cm. long in fruit; bracts ovate, aristate, membranous, persistent, 3—4 mm. long; bracteoles broadly ovate with a hard spine as long as or slightly longer than the blade, deciduous with the perianth, 3—5 mm. long. *Perianth*-lobes lanceolate, aristate, subequal, with narrow membranous margins, 3—6 mm. long. *Stamens* 5; filaments filiform; staminodes fimbriate; anthers oblong, scarcely 1 mm. long. *Utricle* oblong-cylindric, membranous, enclosed in the hardened perianth, 2—3 mm. long. *Seed* brown; cotyledons long, inflexed. Moq. in DC. Prodr. XIII. 2. 314; Roxb. Fl. Ind. I. 672 and Ed. Carey and Wall. II. 496; Dalz. and Gibs. Bomb. Fl. 218; Wight Ic. t. 1777; Trimen Fl. Ceyl. III. 404; Wall. Cat. 6924 excl. H; Miq. Fl. Ind. Bat. I. 1. 1042; Hook. f. Fl. Br. Ind. IV. 731; Cooke Bomb. Fl. II. 495; Prain Beng. Plants 875; Baill. Hist. des Pl. IX. 153. tt. 221—223. 'Cadelari' Rheede Hort. Mal. 155, t. 78.

SINGAPORE: Ridley 10632!—DISTRIB. India, Ceylon and all tropical regions.

## 9. ALTERNANTHERA, Forsk.

Herbs, usually prostrate, at any rate at base. *Leaves* opposite. *Flowers* hermaphrodite, small, white, in axillary often clustered heads; bract and 2 bracteoles scarious. *Perianth* segments 5, unequal, the 2 lateral innermost, concave. *Stamens* 2—5; filaments short, connate in a short cup, with or without intervening staminodes; anthers 1-celled. *Ovary* orbicular or ovoid; style short; stigma capitate; ovule solitary, pendulous from a long basal funicle. *Fruit* a compressed ovoid orbicular or obcordate utricle, the margins usually thickened or winged. *Seed* inverse, lenticular; testa coriaceous or crustaceous; embryo annular, surrounding the floury albumen; cotyledons narrow; radicle superior.—DISTRIB. Species about 16, tropical and subtropical.

1. ALTERNANTHERA SESSILIS, Br. Prodr. Flor. Nov.-Holl. 417 (1810). A prostrate herb, or the lower part of the stem prostrate and rooting, the upper erect; branches many, glabrous below, the uppermost with 2 opposite lines of soft hairs. *Leaves* somewhat fleshy linear-oblong, lanceolate, oblanceolate or elliptic, obtuse or subacute at apex, narrowed at base; both surfaces glabrous; margins entire or obscurely denticulate; 1—5 cm. long, 1—2 cm. broad; main nerves 5—7 pairs, obscure; petiole very short or 0. *Flowers* sessile, white, shining, in small axillary sessile heads; bract and bracteoles ovate, acuminate, scarious, 1—1.5 mm. long. *Perianth*-segments 5, nearly equal, ovate, acuminate, scarious, 1-nerved, 2—3 mm. long. *Stamens* 2—3, very short; staminodes usually 0. *Ovary* obcordate, compressed, broader than long; style very short. *Utricle* obcordate, compressed, about 2 mm. long by 3 mm. broad, margins prominently thickened. *Seed* 1—1.5 mm. in diam., suborbicular; testa coriaceous, dark brown. Moq. in DC. Prodr. XIII. 2. 357; Dalz. and Gibs. Bomb. Fl. 220; Wight Ic. t. 727; Wall. Cat. 6921; Miq. Fl. Ind. Bat. I. 1. 1048; Hook. f. Fl. Br. Ind. IV. 731; Prain Beng. Plants 875. *A. triandra*, Lam. Encyc. Method. I. 95; Trimen Fl. Ceyl. III. 405; Cooke Bomb. Fl. II. 499. *A. denticulata*, Wall. Cat. 6922. *A. prostrata*, Don Prodr. Fl. Nep. 86; Moq. l. c. 360 for the most part. *Gomphrena sessilis*, Linn. Sp. Pl. 225. *Achyranthes triandra*, Roxb. Fl. Ind. I. 678 and Ed. Carey and Wall. II. 505. "Coluppa" Rheede Hort. Mal. X. 21. t. 11.

PENANG: Curtis 1043!; Deschamps! PERAK: Scortechini! SELANGOR: Goodenough! PAHANG: Ridley 1214! SINGAPORE: Kunstler 143! Deschamps!—DISTRIB. All warm countries.

## Family XCV.—POLYGONACEÆ.

By A. T. Gage.

Herbs or shrubs. *Leaves* usually alternate and entire, sometimes serrulate. *Stipules* usually membranous and forming a tube encircling the stem. *Inflorescence* axillary, racemose, spicate, capitate or paniculate. *Flowers* usually bi-sexual, pedicellate; perianth-segments 3—6, usually 5, free or more or less connate, imbricate in the bud, persistent. *Stamens* usually 5—8, perigynous. *Disc* annular, glandular or absent. *Ovary* free, biconvex or 3—4-angled. *Styles* 1—3; stigmas various, usually capitellate. *Ovule* 1, orthotropous; nutlet hard, usually included in the perianth. *Seed* erect, with membranous testa and horny or floury albumen. *Embryo* usually lateral, radicle superior.—**DISTRIB.** Species over 600, distributed all over the world, but with a preponderance of species in temperate regions.

## 1. POLYGONUM, Linn.

Herbs or shrubs. *Leaves* alternate, entire, usually petioled, stipules forming a membranous tube (ocrea) surrounding the stem. *Inflorescence*—in the Malayan Peninsular species—a branched spiciform raceme or a capitate panicle. *Flowers* small, pink or white, pedicellate in the axils of small membranous spathe-like bracts. *Perianth*-segments usually 5. *Stamens* 5—8, perigynous, usually with minute yellow glands between the bases of the filaments; anthers usually pink or purple. *Ovary* lenticular or trigonous. *Styles* 2—3; stigmas capitellate. *Nut* included in the perianth, biconvex or trigonous, brown or black, usually polished.

*Inflorescence* of branched spiciform racemes:—

*Ovary* and nutlet bi-convex:—

- |  |                           |
|--|---------------------------|
| Stem stout, over 6 dm.; leaves large, 23 cm. long, 4·5 |                           |
| cm. broad, very tomentose .. ..                        | 1. <i>P. tomentosum</i> . |
| Stem slender, less than 3 dm.; leaves small, 6·5 cm.   |                           |
| long, 6 mm. broad, glabrous or minutely strigose ..    | 2. <i>P. minus</i> .      |

*Ovary* and nutlet trigonous:—

- |                           |                         |
|---------------------------|-------------------------|
| Perianth eglandular .. .. | 3. <i>P. barbatum</i> . |
|---------------------------|-------------------------|

*Perianth* glandular:—

- |   |                           |
|---|---------------------------|
| Raceme very long, slender, decurved and long-inter- |                           |
| rupted .. ..  | 4. <i>P. flaccidum</i> .  |
| Raceme rather short, scarcely decurved and short-   |                           |
| interrupted .. ..                                   | 5. <i>P. Hydropiper</i> . |

*Inflorescence* of capitate panicles:—

- |                        |                         |
|------------------------|-------------------------|
| An unarmed shrub .. .. | 6. <i>P. chinense</i> . |
|------------------------|-------------------------|

Plants usually with recurved prickles on stem and leaves, sometimes only one or two at the base of the stipules:—

Nutlet trigonous	..	..	..	7. <i>P. strigosum</i> .
Nutlet biconvex	..	..	..	8. <i>P. pedunculare</i> .

It is curious that *P. plebejum*, although so widely spread throughout the tropics, appears to be as conspicuously absent from the Malayan Peninsula as from Ceylon.

1. *POLYGONUM TOMENTOSUM*, Willd. in Sp. Pl. II. 447 (1799). Root-stock prostrate, annual. *Stems* 6—12 dm., stout, erect, unbranched, with well developed internodes, grooved and glabrous or slightly pubescent where exposed. *Leaves* light green when fresh, very shortly petioled lanceolate, finely acuminate both at apex and base, strigosely or silkily hairy on both surfaces, 14—28 cm. long and 2.5—4.5 cm. broad; petiole 6 mm. long; veins numerous, 20—30, often obscure. *Stipular-tube* well developed, membranous, almost or entirely concealing the internode and impressed by its grooves and furrows, sparsely or thickly strigosely hairy; mouth truncate, beset with stiff cilia. *Inflorescence* of branched spiciform racemes; peduncles stout, strigose; racemes 5—10 cm., erect; bracts crowded, tubular, strigose and ciliate. *Flowers* 4—6 in the axil of each bract; pedicels about 3 mm. long, articulated below the perianth, and surrounded at the base by a delicate hyaline membranous bracteole. *Perianth* eglandular, about 4 mm. in diameter, white; segments 5, subequal, strongly veined. *Stamens* 5—8, alternating with minute glands at the base of the filaments which are nearly as long as the perianth segments; anthers large. *Ovary* lenticular. *Style* short, bifid above; stigmas capitate. *Nut* large, biconvex or orbicular, black polished, closely invested by the perianth. Roxb. Hort. Beng. 29 and Fl. Ind. II. 287; Miq. Fl. Ind. Bat. I. i. 1006; Hook. f. Fl. Br. Ind. V. 30; Wall. Cat. 1709 C and D. *Polygonum ocreatum*, Houtt. Pfl. Syst. VI. 442. t. 49, f. 1. *Polygonum pulchrum*, Blume Bijdr. 530.

PERAK: *Kunstler* 393!; *Wray* 2034!; at Ipoh, *Curtis* 3178!; *Deschamps*!.—DISTRIB. Africa, India, Burma, Andamans, Siam, Malayan Archipelago, Philippines.

2. *POLYGONUM MINUS*, Huds.; Meissn. in DC. Prodr. XIV. 1. 111 (1856). *Stem* creeping or ascending or erect, 15—30 cm. faintly grooved, glabrous. *Leaves* sessile, linear or lanceolate, acute, glabrous or minutely strigose, especially on the midrib and nerves beneath, 2—5.7 cm. long and about 6 mm. broad; nerves few or none apparen

*Stipular-tube* much shorter than the internodes, sparsely adpressedly strigose, truncate; mouth beset with stiff cilia considerably shorter than the tube. *Inflorescence* of branched spiciform racemes; peduncles slender, glabrous; racemes 1.3—2.5 cm., erect; bracts tubular, glabrous, stoutly ciliate. *Flowers* minute, 5 or more in the axil of each bract, on pedicels as long as or longer than the perianth segments. *Perianth* eglandular, segments 5, subequal. *Stamens* 5—8, very small. *Style* bifid above; stigmas capitellate. *Nut* minute, lenticular, black polished, included in the perianth. Boiss. Fl. Orient. IV. 1029; Miq. Fl. Ind. Bat. I. i. 1002; Hook. f. Fl. Br. Ind. V. 36; *Polygonum Posumbu*, Wall. Cat. 1722. *Polygonum tenellum*, Bl. Bijdr. 530. *Polygonum hypostictum* Miq. in Herb. Hohen. 971. *Polygonum strictum*, Allioni, Wight Ic. t. 1800.

PERAK: *Kunstler* 810!. PAHANG: *Ridley* 1616!.—DISTRIB. Europe, Temperate and Tropical Asia, Australia. Introduced into America.

3. *POLYGONUM BARBATUM*, Linn.; Meissn. in DC. Prodr. XIV. 1. 104 (1856). Branches stout, erect, glabrous, slightly grooved, 3—12 dm. *Leaves* very shortly petioled, lanceolate or linear-lanceolate, acuminate at both apex and base, glabrous or sparsely strigose or strigose only on the margins or midrib beneath, 9.5—15 cm. long, 1.3—2.5 cm. broad. *Stipular-tube* much shorter than the internodes, membranous, glabrous or with adpressed strigose hairs; mouth truncate, with stiff cilia longer or shorter than the tube. *Inflorescence* of branched spiciform racemes; peduncles slender, glabrous or more or less strigose. *Racemes* about 5.7 cm. long; bracts crowded, tubular, glabrous, stiffly ciliate. *Flowers* 4 or more in the axil of each bract; pedicels as long as or longer than the perianth segments. *Perianth* white, eglandular, very small; segments 5, subequal. *Stamens* 5—8, unequal, alternating with minute basal glands. *Ovary* trigonous. *Style* trifid above, stigmas capitellate. *Nutlet* trigonous, blackish brown, polished, included in the perianth. Bab. in Trans. Linn. Soc. XVIII. 100; Wall. Cat. 1708; Wight Ic. t. 1798; Miq. Fl. Ind. Bat. I. i. 999. Hook. f. Fl. Br. Ind. V. 37. *Polygonum hispidum*, Ham. *Polygonum rivulare*, Koen.; Roxb. Fl. Ind. III. 290; Grah. Cat. Bomb. Pl. 172. *Polygonum Hornemanni*, Meissn. in DC. l. c. 107.

JOHOR: *Ridley* 11024!. MALACCA: *Griffith*!. PENANG: *Curtis* 2785!. PERAK: at Ipoh, *Curtis* 3179!. SELANGOR: *Goodenough* 10461!. SINGAPORE: *Hullett* 10!; *Goodenough* 1604!; *Ridley* 3756!, 10729!.—DISTRIB. Tropical Asia and Africa, and Australia.



4. *POLYGONUM FLACCIDUM*, Meissn. in DC. Prodr. XIV. 1. 107 (1856). Stem erect or ascending, 6—9 dm., simple or branched, glabrous or more or less strigose, grooved and often glandular. *Leaves* shortly petioled, lanceolate or elliptic-lanceolate, acuminate, many nerved, glabrous or hispid or strigose on the midrib, margin, and nerves on both surfaces, glandular, 6.3—15 cm. long and 1.5—3.8 cm. broad. *Stipular-tube* much shorter than the internode, adpressedly strigose, often glandular; mouth truncate, beset with long stout cilia. *Inflorescence* of long filiform branched decurved spiciform racemes; peduncles glabrous, often glandular; racemes 5—16 cm. long; bracts distant, tubular, glabrous, often glandular, shortly ciliate. *Flowers* 3 or more in the axil of each bract, on pedicels as long as or longer than the perianth segments. *Perianth* segments 5, pink, subequal, thickly glandular. *Stamens* 7—8, subequal. *Ovary* trigonous. *Style* trifid almost to the base; stigmas capitellate. *Nutlet* small, trigonous, black, granulate. Boiss. Fl. Orient. IV. 1029; Hook. f. Fl. Brit. Ind. V. 39. *Polygonum tenellum*, Roxb. Fl. Ind. II. 289. *Polygonum mite*?, Wall. Cat. 1721, 1721-1. *Polygonum Rottleri*, Roth Nov. Pl. Sp. 205.

PERAK: *King's Collector* 809!, 2503!; *Ridley* 2964!. PAHANG: *Ridley* 1335!.—DISTRIB. India and Malayan Archipelago.

5. *POLYGONUM HYDROPIPER*, Linn Sp. Pl. 361 (1753). An annual herb with stout erect or ascending stem; branches obscurely grooved, glabrous and often glandular. *Leaves* subsessile or very shortly petioled, lanceolate or oblong lanceolate, glabrous or with midrib nerves and margin more or less scabrid, often glandular, 5—9 cm. long and 1—2 cm. broad. *Stipular-tube* much shorter than the internode, membranous, glabrous or sparingly strigose; mouth truncate, shortly ciliate. *Inflorescence* of terminal and axillary, simple or branched, slender flexuous spiciform racemes; bracts more or less irregularly distant, tubular, glabrous, glandular or eglandular, shortly ciliate or eciliate. *Flowers* 2 or more in the axil of each bract, on pedicels as long as the perianth segments. *Perianth* pink, segments 5, thickly glandular, 2 outer narrower than the three inner. *Stamens* 5—8; anthers minute. *Ovary* trigonous; style trifid above; stigmas capitellate. *Nutlet* trigonous, black, granulate. Meissn. in DC. Prodr. XIV. 1. 109; Boiss. Fl. Orient. IV. 1029; Fl. Dan. t. 1576. *Polygonum Donii*, Wight Ic. t. 1801.

NEGRI SEMBILAN: *Ridley* 10024! PAHANG: *Ridley* 2254!.—DISTRIB. Cosmopolitan.

6. *POLYGONUM CHINENSE*, Linn. Sp. Pl. 363 (1753). A small shrub reaching a height of 1.5 m.; stem and branches glabrous or slightly pubescent, sometimes glandular, grooved. *Leaves* with a short petiole 6—12 mm. often auriculate and slightly winged above; lamina oblong-ovate or deltoid-ovate, acute, base truncate, rounded or acute, of upper leaves often cordate or amplexicaul, glandular or not, usually glabrous, sometimes sparsely hispidly-hairy especially on the midribs and nerves beneath; margins crenulate or entire; nerves from 5 or 6 to 20 or more, prominent beneath. Length of lamina 2.5—16 cm., breadth 2—8 cm. *Inflorescence* of axillary and terminal corymbose or paniculately branched leafily-bracteate cymes bearing the flowers in few or many capitulate clusters; peduncles glandular or hispidulous, especially near the flower heads; capitula 6—8 mm. in diameter; bracts of the flower-clusters glabrous or hispidly-hairy, eciliate. *Perianth* segments 5, white or pink, subequal, eglandular. *Stamens* 7—8, in two whorls alternating with small basal glands. *Ovary* trigonous; style trifid above; stigmas capitate. *Nutlet* trigonous, granulate, variable in size. Meissn. in DC. Prodr. XIV. 1. 130; Monog. 60; in Wall. Pl. As. Rar. III. 60; Bab. in Trans. Linn. Soc. XVIII. 109; Roxb. Fl. Ind. II, 289; Wight Ic. t. 1806; Grah. Cat. Bomb. Pl. 172; Dalz. and Gibs. Bomb. Fl. 214; Hook. f. Fl. Brit. Ind. V. 44. *Polygonum cymosum*, Roxb. l. c. *Polygonum auriculatum*, Meissn. Monog. 39, t. 6; Wall. Cat. 1705 A. and L. *Polygonum polycephalum*, Wall. Cat. 1707. *Polygonum brachiatum*, Poir. Dict. IV. 15; Wall. Cat. 1706. *Polygonum patens*, Don Prodr. 73; Meissn. Monog. 60. *Polygonum corymbosum*, Willd. Sp. Pl. II. 452. *Polygonum ovatum*, Heyne in Roth. Nov. Sp. 206. *Polygonum adenotrichum*, Wall. Cat. 1705 E. *Ampelgynum chinense*, Lindl. in Bot. Regist. 1838. *Coccoloba crispata*, Ham. in Roxb. Fl. Ind. II. 292. *Coccoloba indica*, Wall. Cat. 1705 H.

PERAK: *Scortechini*!; *Kunsiler* 7968!.—DISTRIB. India, Ceylon, Burma, Malayan Archipelago, Philippines, China and Japan.

7. *POLYGONUM STRIGOSUM*, R. Br. Prodr. Fl. Nov. Holl. 420, (1810). *Stem* stout, 6—12 dm., erect or ascending, grooved and more or less covered with recurved prickles. *Leaves* shortly petioled, linear-oblong, acute, base truncate or shallow-cordate, glabrous or pubescent beneath, nerves numerous; petiole 6—12 mm. long; lamina 2.5—7.5 cm. long and 6—18 mm. broad. Petiole, margin and midrib beneath beset with retrorse prickles. *Stipular-tube* much shorter than the internode and encircled with a ring of recurved prickles



at the base, membranous, glabrous or adpressedly strigose, mouth shortly ciliate. *Inflorescence* of corymbose or paniculate cymes bearing about 3—6 obpyramidal or shortly oblong capitula; peduncles thickly glandular-hairy; bracts glandular-hairy and ciliate. *Flowers* rather large, on pedicels as long as the perianth segments. *Perianth* tubular; lobes 5, shallow. *Stamens* 5, minute. *Ovary* flat; style bifid above; stigmas capitellate. *Nutlet* bi-convex. Meissn. in DC. Prodr. XIV. i. 134; Hook. f. Fl. Br. Ind. V. 47. *Polygonum horridum*, Roxb. Fl. Ind. II, 291; Meissn. in Wall. Pl. As. Rar. III. 58, and in DC. Prodr. XIV. i. 133; Wall. Cat. 1697 B and D. *Polygonum muricatum*, Wall. Cat. 1697. *Polygonum sagittatum*, Don Prodr. 73.

PENANG: Wallich 1697 D in Herb. Calcutt.!.—DISTRIB. India, Burma, Ceylon, Malayan Archipelago, China.

8. POLYGONUM PEDUNCULARE, Wall. Cat. 1718 (1828). *Stem* somewhat slender, erect, 3—6 dm., grooved, glabrous or with a few scattered retrorse prickles. *Leaves* shortly petioled, lanceolate or oblong acute, base acute, often unequal or truncate or shallow-cordate, many nerved, glabrous or minutely scaberulous on the margin and midrib beneath; petiole 6—12 mm. long; lamina 2.5—6.3 cm. long and 6—25 mm. broad. *Stipular-tube* considerably shorter than the internode, glabrous or minutely prickly or with a few retrorse prickles surrounding the base, mouth eciliate. *Inflorescence* of paniculately divaricate slender branches, bearing a few globose or shortly oblong heads; peduncles slender, glabrous or sparsely hispid; bracts glabrous, eciliate or very shortly and sparingly ciliate. *Flowers* very shortly pedicelled; perianth segments 5, subequal. *Stamens* 5. *Ovary* lenticular; style bifid above; stigmas capitellate. *Nutlet* biconvex or globose, polished. Meissn. in DC. Prodr. XIV. 1. 133 in part; Miq. Fl. Ind. Bat. I., i. 1011. Hook. f. Fl. Br. Ind. V. 48. *Polygonum glabratum*, Wall. Cat. 6285.

JOHORE: Ridley 4220! and 11027!. MALACCA: Griffith!; Stoliczka!. PAHANG: Ridley 1616!. PENANG: Deschamps!. PERAK: Wray, 1890!, 2030!; Kunstler 2498!; Ridley 2965!. SELANGOR (?): Ridley 8175!. SINGAPORE: Wallich 1718!.—DISTRIB. India, Ceylon, Malayan Archipelago, Australia, Philippines, China.

#### Family XCVII.—ARISTOLOCHIACEÆ.

Herbs or shrubs, often climbing, usually with more or less unpleasant odour. *Leaves* alternate, petiolate, entire or lobed; stipules 0.

*Flowers* hermaphrodite, often large, usually lurid; terminal, axillary or lateral; solitary, racemose or cymose; bracts various, often wanting. *Perianth* simple, more or less adnate to the top of the ovary, regular or irregular, 3-lobed or tubular and variously shaped, the lobes valvate. *Stamens* 6 or more, adnate in 1 or 2 series to the style-column; cells parallel, extrorse, opening longitudinally. *Ovary* 4—6-celled; placentas parietal, free or meeting in the axis; ovules numerous, anatropous; style columnar ending in stigmatic lobes. *Fruit* capsular or baccate. *Seeds* numerous, horizontal or pendulous; albumen fleshy, copious, embryo minute.—DISTRIB. Species about 200, chiefly tropical.

Perianth regular; ovary 4-celled; capsule elongate

Stamens uniseriate. . . . . 1. APAMA.

Stamens biseriate . . . . . 2. THOTEA.

Perianth irregular, usually tubular with an inflated base and

expanded limb; capsule not elongate . . . . . 3. ARISTOLOCHIA.

#### 1. APAMA, Lamk.

Shrubs or undershrubs, with stellate hairs or glabrate. *Leaves* alternate, petiolate, 3—5-ribbed, nerves and reticulations prominent beneath; stipules 0. *Flowers* in axillary or terminal or sub-radical bracteate cymes. *Perianth* shortly campanulate, equally 3-lobed, valvate. *Stamens* 6 to 12, uniseriate, free or connate around the style; anthers extrorse; cells 2; connective thick. *Ovary* inferior, elongate, 4-celled; style short; stigmas 3 or more, free or spreading in a flattened disk; ovules numerous, uniseriate in vertical rows from the axis, pendulous. *Capsule* elongate, 4-gonous, the keeled valves dehiscing septicidally from the central placenta of cruciform section. *Seeds* very many, oblong, trigonous, sometimes winged, attached in the furrows of the placenta in a vertical row; testa rugose, with a crustaceous outer and a membranous inner integument; albumen fleshy; embryo minute.—DISTRIB. Species 4 or 5, India and Malaya, one species in China.

Style column expanded in a disk; perianth-tube spreading;  
stamens more than 6, short, connate; leaf-ribs reaching  
nearly to the apex of the ovate long acuminate leaf (Sect.

1. BRAGANTIA) . . . . . 1. *A. corymbosa*.

Style column divided in 3 erect stigmas; perianth-tube  
urceolate-campanulate; stamens 6, long, free; leaf-ribs  
reaching scarcely to the middle of the ovate-orbicular,  
acute leaf (Sect. 2. CYCLODISCUS) . . . . . 2. *A. tomentosa*.

1. *APAMA CORYMBOSA*, Soler. in Engl. & Prantl Naturl. Pflanzenfam. III. i. 272 (1889). A spreading shrub reaching 2.5 to 3 m. in height; branchlets brown, terete, jointed at the nodes. *Leaves* distichous, chartaceo-coriaceous; ovate ovate-oblong or ovate-lanceolate, long cuspidate-acuminate at apex, rounded or cuneate at base, entire; upper surface smooth, shining, glabrous except on the ribs and nerves, lower glaucescent and finely stellate-puberulous; 8—16 cm. long, 4—7 cm. broad; ribs 5 from the base, the outer pair close to the margin, the inner pair extending nearly to the apex; main nerves from the midrib 1 to 3 pairs, all joined by very prominent transverse nervules and reticulations; petiole short, about 5 mm. long, twisted. *Cymes* corymbose, terminal and axillary in upper leaf-axils, 5—8 cm. long and about as broad, minutely grey-puberulous; bracts linear, subulate, up to 5 mm. long; branches spicate; buds depressed. *Perianth-tube* spreading; lobes cordate, acute, 2—3 mm. in diam., greenish-grey, thick, rough within. *Stamens* 8 to 10 or more; anther cells parallel, short, rather distant. *Stigmas* spreading in a disk. *Capsule* 25—35 cm. long, 5 mm. broad, smooth, acuminate, torulose; pericarp 4-keeled, keels puberulous. *Seeds* trigonous, oblong-lanceolate, winged on the margins and at the ends, 4—6 mm. long, prominently rugose. *Bragantia corymbosa*, Griff. in Trans. Linn. Soc. XIX. 335; Duchart. in DC. Prodr. XV. i. 429; Miq. Fl. Ind. Bat. I. i. 1068; Hook. f. Fl. Br. Ind. V. 73. *B. melastomæfolia*, Duchart. l.c. *Asiphonia piperiformis*, Griff. l.c. 333, t. 37, Notul. 344 and Ic. Pl. Asiat. t. 528; Ann. Sc. Nat. Sér. 3, VII. 338. *Strakæa melastomæfolia*, Presl Epim. Bot. 221.

PENANG and PROVINCE WELLESLEY: Maxwell's hill and Kubang Ulu Reserve, *Curtis* 2045!. PERAK: at Thaipeng and Ralan Tujor, *Wray* 650!, 1793!; Larút Peak and Goping, *King's Collector* 437!, 2875!. SELANGOR: Caves at Kwala Lumpur, *Ridley* 411!. PAHANG: Raub track, *Machado* 11552!. MALACCA: *Griffith* K. D. 4438!; *Maingay* K. D. 1320!; *Lobb*!; *Cuming* 2333!; Bukit Panchore, *Derry* 165!.—DISTRIB. Sumatra (*H. O. Forbes* 2965).

2. *APAMA TOMENTOSA*, Soler. in Engl. & Prantl Naturl. Pflanzenfam. III. i. 272 (1889). A small undershrub, creeping below and rooting, then ascending, reaching 25 to 35 cm. in height; branchlets grey, hispid, furrowed, angular, geniculate and jointed at the nodes. *Leaves* 2 to 3 at the ends of the branchlets, chartaceo-coriaceous; ovate or orbicular-ovate, acute at apex, rounded or cordate at base, entire; upper surface smooth, shining, glabrous, lower white-hispid or villous; 12 to 20 cm. long, 8 to 12 cm. broad; ribs 3 to 7 from the base, the

outer 1—2 pairs close to the margin and faint, the inner pair stout, reaching to about the middle of the leaf; main nerves from the midrib 6—7 pairs, arching upwards, joined prominent by irregular transverse nervules and reticulation; petiole 5 to 10 mm. long, densely hispid. *Cymes* racemose from near the base of the stem, 5 to 10 cm. long, densely grey-hispid; bracts many, persistent, linear or linear-oblong, up to 1 cm. long; buds obovate, depressed at top. *Perianth* dull claret-coloured, yellow at centre; tube urceolate-campanulate below for 5 mm., annulate within, then spreading and divided to below the middle in 3 ovate cordate lobes 5 to 10 mm. in diam., lobes rough within. *Stamens* 6, free above, filaments joined below; anthers 2-celled, linear, surmounted by the acute produced connective. *Style-arms* 3, erect, ending in rounded hispid stigmas produced beyond the stamens. *Capsule* 7 to 9 cm. long, 4 mm. broad, linear, long acuminate, smooth, torulose; pericarp 4-keeled, the bosses of the seeds prominent when dry. *Seeds* trigonous, oblong, not winged, 4 mm. long, prominently rugose. *Bragantia tomentosa*, Blume Enum. Pl. Jav. 82; Duchart. in DC. Prodr. XV. i. 431; Benn. in Horsf. Pl. Jav. Rar. 43, t. 11; Griff. in Trans. Linn. Soc. XIX. 335; Miq. Fl. Ind. Bat. I. i. 1068; Hook. f. Fl. Br. Ind. V. 73. *B. khasiana*, Griff. l.c. *B. latifolia*, Lindl. in Bot. Reg. under t. 1543. *Bragantia* n. sp. Br. in Trans. Linn. Soc. XIII. 219. *Ceranium tomentosum*, Bl. Bijdr. 1135. *Cyclodiscus tomentosus* and *latifolius*, Klotzsch in Monatsb. Berl. Akad. 1859, 592. *Aristoloch.*, Wall. Cat. 9108.

PENANG: Waterfall, Tanjong Tirie and Paya Trobong, *Curtis* 1681!, 2754!. PERAK: *Wray* 3471!. PAHANG: at Kwala Tembeling, *Ridley* 2256!.—DISTRIB. India (Sylhet and Cachar), Burma, Java, Sumatra (Lampongs, *H. O. Forbes* 1672!).

VAR. *lanuginosa*, Hook. f. Leaves densely white-woolly beneath.

KEDAH: Lankawi Island, *Curtis* 1681!. At Kwala, *Yapp* 69!.—DISTRIB. South Andaman Island (*Kurz*).

## 2. THOTTEA, Rottb.

Shrubs, erect or straggling. *Leaves* alternate, shortly petioled, 3—7-ribbed, nerves and reticulations prominent; stipules 0. *Flowers* usually large, in short axillary cymes. *Perianth* broadly campanulate or urceolate, equally 3-lobed, lobes valvate. *Stamens* biseriate, numerous, with short filaments, inserted round the style-column; anthers extrorse; cells 2, rather distant; connective thick. *Ovary* inferior, elongate, 4-celled; style short, thick, arms 5—20, radiating,

sometimes forked, ending in the stigmas; ovules numerous, 2-seriate in vertical rows from the axis, pendulous. *Capsule* elongate, 4-gonous, septicidally 4-valved; placenta free, central, cruciform in section. *Seeds* oblong, trigonous; testa rugose; albumen fleshy; embryo minute. **DISTRIB.** Species 5, of the Malay Peninsula and Archipelago.

- Perianth funnel shaped, widely open, 6—12 cm. long;  
leaves hispid-pubescent beneath; stigmatic rays  
8—15; stamens about 15 in each series.. 1. *T. grandiflora*.  
Perianth urceolate in tube, the lobes spreading,  
about 15 cm. long; leaves glabrous beneath;  
stigmatic rays 6; stamens about 16 in outer, 10 in  
inner series .. .. 2. *T. dependens*.  
Perianth urceolate, nearly closed, less than 1 cm. long;  
leaves hoary-puberulous beneath; stigmatic rays 4—  
6; stamens about 12 in outer, 6 in inner series .. 3. *T. tricornis*.

1. *THOTTEA GRANDIFLORA*, Rottb. in Nye Dansk. Vidensk. Selsk. Skrift. II. 530, t. 2 (1783). An erect shrub, reaching 1—2 m. in height; branches stout, woody, villous with spreading hairs, striate, enlarged and jointed at the nodes. *Leaves* coriaceous, distichous; ovate, ovate-oblong or obovate, acute or shortly cuspidate-acuminate at apex, cordate at base; entire, upper surface sparsely villous when young, glabrous when old except on the midrib, lower surface ferruginously hispid-pubescent; 20—30 cm. long, 10—20 cm. broad; midrib conspicuously raised on both surfaces; ribs from the base 2—3 pairs, rather slender, the inner pair scarcely reaching half-way up; main nerves like the ribs 10 to 12 pairs, raised, slightly curved to the margin, joined by prominent more or less parallel transverse nervules and netted reticulation; petiole stout, ferruginous-villous, 5 to 10 mm. long. *Cymes* simple or branched, spicate, from lower nodes, 3—5 cm. long; bracts conspicuous, leafy, lanceolate, densely tawny villous, 1—3 cm. long. *Perianth* large, funnel-shaped, not constricted, membranous, 6—12 cm. long and as broad at mouth, prominently 9-nerved, and reticulate; deep claret-colour with yellow nerves and spots, villous without, cleft in 3 lobes about  $\frac{1}{3}$ — $\frac{1}{2}$  down. *Stamens* in two series 15 or more in each; filaments short; anthers short, about 1 mm. long. *Ovary* densely villous below; column of styles thick, glabrous, spreading in 8—15 linear or forked stigmatic rays. *Capsule* 10—15 cm. long, straight or twisted, acute at the angle, pubescent. *Seeds* trigonous, 3—4 mm. long, acute at both ends, tubercled. Griff. in Trans. Linn. Soc. XIX. 325, t. 36; in Notul. IV. 346 and in Ic. Pl. Asiat. t. 530, 531; Ann. Nat. Hist. Ser. 3, VII. 328; Benn. Pl. Jav. Rar. i. 45;

Klotzsch in Monatsb. Berl. Akad. (1859) 589; Duchart. in DC. Prodr. XV. i. 428; Miq. Fl. Ind. Bat. I. 1. 1068; Hook. f. Fl. Br. Ind. V. 74; Ridley in Journ. Str. Br. R. As. Soc. (1900) 127.

PERAK: dense jungle near Ulu Kerling, 150—250 m. alt., *King's Collector* 8770!. MALACCA: *Griffith* K. D. 4439!; *Maingay* K. D. 1318!; at Belimbing, *Hervey*!; *Hullett* 204!; at Bukit Benang, *Curtis* 3662!. SINGAPORE: *Oxley*!; *Lobb* 594!; *T. Anderson* 192!; *Kurz*!; at Selitar and Bukit Mandai, *Ridley* 178!, 4691!. Vern. "Seburut" (*Ridley*).

2. *THOTTEA DEPENDENS*, Klotzsch in Monatsb. Berl. Akad. 589 (1859). A shrub, reaching 1—2.5 m. in height; branches stout, fistular, glabrous, enlarged, jointed and geniculate at the nodes; internodes terete. *Leaves* distichous, chartaceous; obovate or obovate-lanceolate, cuspidate-acuminate at apex, cuneate at base, entire; glabrous on both surfaces; 15—25 cm. long, 6—12 cm. broad; 5-ribbed from the base, the lower pair slender, short, close to the margin, the upper at first along the midrib and then straight towards the margin ending about half way up, the midrib stout, conspicuous; main nerves from the midrib like the ribs but more widely curved to and along the margin, 8 to 9 pairs, joined by prominent transverse nervules and these again by reticulations; petiole stout, 5—10 mm. long. *Cymes* simple or branched, spicate, often drooping, from near the base of the stems, 5—7 cm. long, minutely puberulous; bracts conspicuous, leafy, lanceolate; rhachis flexuose; buds depressed, triangular. *Perianth* pale yellow with centre and margin streaked with claret-colour; urceolate below for about 1 cm. in height, then erecto-patent and divided into 3 broad cordate acute lobes about 15 mm. long and 25 mm. broad, each 7-nerved and reticulate, glabrous. *Stamens* in two series, the outer ring of about 16, the inner of about 10; filaments slender, 4—5 mm. long; anthers linear, curved, 4 mm. long. *Ovary* elongate, slender, puberulous; column of styles thick, glabrous, spreading in 6 slender stigmatic rays, 3—4 mm. long. *Capsule* slender, 5—10 cm. long, torulose, keeled, constricted between the seeds when dry. *Seeds* trigonous, 3—4 mm. long, acute at both ends, tubercled. Duchart. in DC. Prodr. XV. i. 428; Hook. f. Fl. Br. Ind. V. 74. *Lobbia dependens*, Planch. in Hook. Lond. Journ. Bot. VI. 144, t. 3; Miq. Fl. Ind. Bat. I. i. 1068. *Piper arborescens*, Roxb. ex Wall. Cat. 6648 B.

PENANG: at Waterfall, etc., *Curtis* 1170!, 1507!; at 250—300 m. in dense jungle, *King's Collector* 1661!. PERAK: at Tapa, *Wray* 1318!, 3151!; at Lumut Dinding, *Ridley* 10346!. SINGAPORE: *Wallich* 6648 B.; *Lobb* 289!



3. *THOTTEA TRICORNIS*, Maingay ex Hook. f. in Fl. Br. Ind. V. 74 (1886). A shrub, reaching 1—2 m. in height; branches stout, pale brown, puberulous, swollen and jointed at the nodes, internodes channelled. *Leaves* coriaceous-chartaceous, distichous; elliptic-oblong or -obovate, or -oblanceolate, acute or acuminate at apex, attenuate and rounded at base, entire; upper surface glabrous, lower hoary-pubescent; 20—30 cm. long, 7—13 cm. broad; 5-ribbed from the base, the midrib stout, prominent, the inner pair slender reaching to about two-thirds up and then looped, the outer pair close to the margin, small, looped; main nerves from the midrib 6—8 pairs, curved upwards and joined by many prominent curved transverse nervules and a conspicuous reticulation, all ribs and nerves much raised beneath; petiole stout, twisted, 6—10 mm. long. *Cymes* paniculate, 3—5 cm. long, densely tawny-puberulous; bracts linear or lanceolate, small, lower ones leafy; buds depressed globose, 8 mm. in diam., the top with 3 raised points. *Perianth* urceolate, only slightly open at the mouth in 3 short lobes, grey and red, leathery. *Stamens* in 2 rows, the outer with 12—14, the inner with 6—8; filaments about 1 mm. long; anthers as long, curved. *Ovary* slender, tawny-puberulous; style column thick below, dividing above in 4 to 6 subulate stigmatic arms 1.5 mm. long. *Capsule* 15 to 20 cm. long, quadrangular, tawny-pubescent, 4—5 mm. in diam., not torulose. *Seeds* oblong-trigonal, shortly tubercled, 4—5 mm. long; 2 mm. thick.

PERAK: *Scortechini*, 1952 etc.!; at Goping, *Kunstler* (King's Collector) 705!. MALACCA: *Maingay*, K. D. 1319!.

### 3. *ARISTOLOCHIA*, Linn.

Shrubs or perennial herbs, prostrate or climbing; rhizome often tuberous. *Leaves* alternate, generally petioled, entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axil, otherwise exstipular. *Flowers* solitary or fasciculate or in the leaf-axils, bracts at the bases of the flowers often rather large. *Perianth* very variable in shape, size and colour; usually the tube inflated below, then contracted in a cylindrical neck, then again expanded in a 2-lipped oblique limb, tube usually villous within. *Stamens* 6 (rarely less or more) adnate to and around the style-column with which the filaments and connectives are merged; cells 2, distinct, extrorse. *Ovary* inferior, 6-celled (rarely less or more); placentas parietal or intruded or connivent and connate in the axis; ovules very many, 1—2-seriate, anatropous, in vertical rows; style column thick, divided

above the anthers in a 3—6-lobed stigmatiferous disk. *Capsule* septically 6-valved or splitting through the placentas. *Seeds* numerous, horizontal, often attached to a part of the placenta which comes away with them, more or less flattened; albumen fleshy; embryo minute, close to the hilum, the radicle outwards.—*DISTRIB.* About 180 species, chiefly tropical.

Leaves ovate, acuminate, deeply cordate

Perianth 4—6 cm. long, upper lip of mouth very short or none; capsule 3—4 cm. long, papery; seeds flat, winged, without an adherent placenta .. .. 1. *A. Tagala*.

Perianth 1.5 cm. long, upper lip very short, rounded or bifid; capsule thick, rugose, 2.5 cm. long; seeds concave, not winged, rugose, with an attached boat-shaped placenta .. .. 2. *A. minutiflora*.

Leaves hastate or prominently and deeply 3-lobed; perianth with upper lip about 3 mm long .. .. 3. *A. Curtisii*.

*A. unguifolia*, Masters in Journ. Linn. Soc. XIV. 494 (1875); Bot. Mag. t. 7424 is a handsome species of Borneo cultivated in the Singapore Bot. Garden. In Journ. Str. Br. R. As. Soc. (1900) 126, Mr. Ridley includes "*A. unguiflora*, Mast." as "local in long wet grass" at Singapore. His specimen from Jurong is in the Kew Herbarium, but in the doubt whether it is not merely a garden escape, I prefer not to include it among wild Peninsular species. It is also found in Sumatra.

1. *ARISTOLOCHIA TAGALA*, Cham. in Linnæa VII. 207 (1832). An extensively climbing shrub, reaching the tops of trees; branchlets glabrous, grooved, twisted. *Leaves* membranous, glabrous, entire; ovate or ovate-oblong, acute or acuminate at apex, deeply cordate at base with the rounded auricles somewhat convergent; 10—20 cm. long, 5—10 cm. broad; pedately 5—7-ribbed at base, the midrib stout, the inner pair of ribs reaching to above the middle of the blade, the outer pairs spreading or deflexed; main nerves from the midrib 3—5, all joined by a lax reticulation; petiole 3—5 cm. long, often flattened, prehensile. *Flowers* in lax, axillary, puberulous racemes 2—6 cm. long, usually 1 only fertile; bracts small, oblong or ovate, often leafy, up to 1 cm. long. *Perianth* 4—6 cm. long; pale green, the lip marked with claret-brown; the base globose, then curved and slender cylindric for about 1 cm., then expanded in an oblique 2-lipped funnel, the upper lip very short or almost none, the lower produced in a linear apiculate lobe 2—3 cm. long, the funnel and lip and the inside of the globose base villous. *Stamens* 6, in a ring adnate to the column; anther-cells rather distant. *Style-column* surmounted by



an undulate fold; stigmatic lobes conical, beaked, connivent at tip. *Capsule* globose-pyriform or oblong, chartaceous, 3—4 cm. long, transversely linear-rugose between the ribs, 6-celled, the pedicels splitting into 6 segments in fruit. *Seeds* very many, horizontal, flattened, variable in shape but usually obtusely triangular and about 1 cm. in diam., with fragile wings and membranous testa, keeled on one side and tubercular on the other; albumen horny, flat, cordate in shape; embryo very minute, the cotyledons rather shorter than the radicle. Klotzsch in Monatsb. Berl. Akad. 597; Duchart. in DC. Prodr. XV. i. 480; Prain Beng. Plants 591; Cooke Bomb. Fl. II. 524. *A. Roxburghiana*, Klotzsch l.c. 596; Duchart. l.c.; Hook. f. Fl. Br. Ind. V. 75. *A. acuminata*, Roxb. Fl. Ind. III. 489 (not of Lamk.); Wall. Cat. 2705; Wight Ic. t. 771; Miq. Fl. Ind. Bat. I. i. 1066; Dalz. and Gibs. Bomb. Fl. 224.

PENANG: *Wallich* 2705!; *Curtis* 2464!; *Deschamps*!. PERAK: *Wray* 1439!, 2295!, 3247; *King's Collector* 2745!, 5000!, 8359!, 10552!, 10577!. SELANGOR: *Ridley* 7613!. PAHANG: *Ridley* 2255!. MALACCA: *Maingay* K. D. 1321!.—DISTRIB. India, Ceylon, Burma, Siam, Java, Sumatra (*Forbes* 2921!), Philippines.

2. *ARISTOLOCHIA MINUTIFLORA*, Ridley ex Gamble in Kew Bull. 79 (1910). A slender climbing shrub; branches dark brown, corky-barked, sulcate, much twisted; branchlets very wiry, angular. *Leaves* membranous, glabrous, entire; ovate or ovate-lanceolate, acuminate at apex, deeply cordate at base, the auricles rounded somewhat converging inwards, the sinus 1.5 cm. deep and about as much broad; 5—15 cm. long, 3—7 cm. broad, the broadest near the base; pectately 5—7-ribbed at base, the midrib prominent, the inner pair of ribs also prominent and reaching nearly (quite, with loops!) to the apex, the outer pairs very slender, horizontal or deflexed; main nerves 2—3 from the midrib, reticulations faint; petiole slender, twisted, 3—5 cm. long. *Flowers* in lax axillary few-flowered slender puberulous racemes about 1 cm. long; bracts ovate acuminate, sheathing, 3 mm. long, puberulous. *Perianth* in all 1.5 cm. long, red and light grey (Kunstler), the base globose, 3 mm. in diam., followed by a curved tube 3 mm. long, then expanded in a 2-lipped funnel, the upper lip very short, rounded or 2-cleft, the lower produced in a linear twisted lobe 9 mm. long, the whole puberulous. *Stamens* 6, minute, connivent in a ring, the cells obtuse. *Ovary* puberulous, 6-furrowed; style slender, surmounted by a very short column ending in a peltate 6-lobed disk, the lobes conical-apiculate. *Capsule* obovate, 2.5 cm. long, 6-ribbed,

transversely marked by the prominent edges of the seeds. *Seeds* many, pyriform, concave, nearly 1 cm. long, attached to a crustaceous boat-shaped placenta; testa granular-rugose; albumen conform to the seed, fleshy; embryo very minute. Ridley M.S. in Herb. Calc.

PERAK: at Lumut, in dense jungle, *Ridley* 8022!; at Simpit Dindings, *Ridley* 10259!; at Larut in very moist places, *King's Collector* (*Kunstler*) 1964!.

VAR. *dolabrata*, Gamble. *Perianth* with the upper lip produced for about 3 mm. and broadened, the lower 1 cm. long; in bud the lips closed up and with the tube having the form of an oblique pickaxe. *Leaves* as in type, always broadest near the base opposite the insertion of the petiole, above that sometimes a little indented. *Flowers* 'french grey, throat dark claret-brown' (Wray); 'lower part dark blue, middle greyish-white, top lighter blue; fruit yellowish-red when ripe' (*Kunstler*).

PERAK: Maxwell's Hill, *Wray* 2997!; Larut, 900—1100 m., *King's Collector* 2969!.

There are very few flowers available for examination and no fruit. The stamens and column are identical with those of *A. minutiflora* and the leaves are almost exactly the same. The perianth differs, however, and when better material is available, it may prove to be a good species.

3. *ARISTOLOCHIA CURTISII*, King ex Gamble in Kew Bull. 78 (1910). A rather small climbing shrub; branches with corky bark; branchlets wiry, sulcate, twisted, glabrous. *Leaves* chartaceous; younger ones broadly hastate; older ones broad, deeply digitately 3-lobed, the middle lobe oblong lanceolate acuminate mucronate, the side lobes spatulate rounded incurved, base cuneate; both surfaces glabrous, margins entire; hastate young leaves about 10 cm. long by 16 cm. broad, the sinus 1—3 cm. deep, old leaves 10—20 cm. long, 10—30 cm. broad, the sinuses reaching to within 2—6 cm. of the base; nervation pedately flabellate, 3-ribbed at the base; the central rib the midrib of the middle lobe; the outer ribs at first on the margin of the cuneate base, then giving off two interior ribs which form the outer ribs of the middle lobe close to its edges, next giving off one after the other two ribs for the outer lobes and finally itself forming a slender intramarginal rib to the same; the ribs of the outer lobes with few arcuate anastomosing nerves, the whole connected by transverse nervules and a netted reticulation; petiole slender, curved, channelled, 5—10 cm. long. *Flowers* in 1—3, axillary, prominently bracteate, racemes about 5 cm. long; rhachis zigzag; bracts amplexicaul, reddish,

ovate-acuminate, 1—1.5 cm. long; flowers 'velvety dark blue and pink' (*Kunstler*). *Perianth* puberulous, oblong and inflated at base, 1—5 cm. long, narrowed into a short tube 5 mm. long and then expanded in 2 lips; the upper short rounded, 3 mm. long; the lower acuminate, 2—2.5 cm. long. *Stamens* 6, sessile, inserted around the style-column; anther-cells 2, very distinct. *Style-column* short, expanded in a 6-lobed stigmatic disk with short conical tips. *Capsule* oblong, obtuse, 4 cm. long, 6-ribbed, the ribs winged when young. King M.S. in Herb. Calc.

PENANG: Government Hill, *Curtis* 330!; at Waterfall, *G. King*! at 150 m. in dense forest, *King's Collector* (*Kunstler*) 1453!

#### Family XCIX.—CHLORANTHACEÆ.

Herbs, shrubs or trees, usually aromatic. *Leaves* opposite, usually toothed, the petioles often connate in a sheath; stipules small, subulate, usually on the margin of the sheath. *Flowers* in terminal or pseudo-axillary spikes, heads or panicles; unisexual or the male and female cohering and hermaphrodite supported by a bract; ♂ flowers without perianth, ♀ with a 3-toothed limb adnate to the ovary. *Stamens* 1 or 3, connate; filaments very short and thick; anthers 2-celled, or, if 3 stamens, the side ones 1-celled. *Ovary* 1-celled; style very short; ovule 1, orthotropous, pendulous from the top of the cavity. *Fruit* a small, ovoid or globose, drupe; exocarp fleshy endocarp crustaceous. *Seed* pendulous; testa membranous; albumen copious, fleshy; embryo minute; cotyledons divaricate or scarcely distinct; radicle inferior.—*Distrib.* Genera 3, tropical and subtropical; but not African.

##### 1. CHLORANTHUS, Swartz.

Perennial herbs or shrubs, the stems articulate at the nodes. *Flowers* in terminal simple or paniced spikes; hermaphrodite, the ♂ and ♀ connate on a bract at the base; perianth 0. *Stamens* 1 or 3 confluent; if 3, the central anther 2-celled, the side ones 1-celled. *Ovary* naked; stigma sessile, truncate.—*DISTRIB.* About 10 species, Eastern Asiatic.

*Stamens* 3, connate by their connectives; leaves finely serrate. 1. *C. officinalis*.

*Stamen* 1, 4-celled on a broad connective; leaves coarsely

serrate

..

..

..

..2. *C. brachystachys*.

##### 1. CHLORANTHUS OFFICINALIS, Blume Enum. Pl. Jav. 79 (1827).

A small erect glabrous undershrub reaching 1—2 m. in height.

*Leaves* variable in shape and size, usually elliptic or elliptic-lanceolate or elliptic-oblong, acuminate at apex, also usually at base; margin, finely glandular serrate; 7—25 cm. long, 2.5—10 cm. broad; main nerves about 10 pairs, curving upwards and joined by rather prominent but wide reticulations; petiole 0—1 cm. long, each pair joined in a sheath bearing minute subulate stipules. *Inflorescence* 5—13 cm. long; spikes 2.5 to 5 cm. long, slender; bracts sheathing, ovate, acute. *Stamens* 3 connate by their connectives, the middle anther 2-celled, the lateral 1-celled. *Berries* 5 to 6 mm. in diam., globose, white. Fl. Jav. III. 10. t. 1. Solms in DC. Prodr. XVI. i. 474; Miq. Fl. Ind. Bat. I. i. 801; Hook. f. Fl. Br. Ind. V. 100. *C. elatior*, Br. in Bot. Mag. t. 2190. *C. erectus*, Sweet; Wall. Cat. 6881. *Cryphea erecta*, Ham. in Brewst. Ed. Journ. (1825) 11, t. 2.

PENANG: Wallich 6881!. PERAK: Curtis 1180!, 1708!; forests near Larut at about 1000 m. alt., King's Collector 4235!. DINDINGS: Ridley!. MALACCA: Griffith 4396!; Maingay (K. D.) 1337!. SINGAPORE: Hullett 16!.—DISTRIB. N. India, Burma, China, Malay Archipelago, Philippines.

2. *CHLOBANTHUS BRACHYSTACHYS*, Blume Fl. Jav. fasc. VIII. 13, 14, t. 2 (1828). A small erect glabrous undershrub reaching 1 m. high or more; branchlets terete. *Leaves* subcoriaceous; lanceolate or elliptic-lanceolate, long acuminate at apex, long attenuate at base; margins coarsely glandular-serrate; 10—20 cm. long, 3—7 cm. broad; main nerves 7—10 pairs, rather irregular; reticulations not prominent; petiole about 1 cm. long, each pair joined in a sheath bearing 2 small linear subulate stipules on either side. *Inflorescence* 3—8 cm. long; spikes 1—2 cm. long, rather dense; bracts small, acute. *Stamen* 1, short, depressed; anther-cells 4, connective broad. *Berries* 5—6 mm. in diam., globose, red. Wall. Cat. 6880; Solms in DC. Prodr. XVI. i. 475; Miq. Fl. Ind. Bat. I. i. 801, and Ann. Mus. Lugd.-Bat. III. 129; Benth. Fl. Hongk. 334; Hook. f. Fl. Br. Ind. V. 100. *C. monander*, Br. in Bot. Mag. t. 2190 in note. *C. ceylanicus*, Miq. l. c. 802. *C. denticulatus*, Cord. in Adans. iii. 296. *Ascarina serrata*, Blume Enum. Pl. Jav. I. 79. *Sarcandra chloranthoides*, Gardn. in Calc. Journ. Nat. Hist. VIII. 348; Wight Ic. t. 1946; Cord. l. c. 301.

PENANG: Wallich 6880!; Government Hill, Maingay (K. D.) 1338!; Curtis 1050!; Deschamps. PERAK: in Batang Padang Valley at about 1000 m. alt., Wray 1479!. PAHANG: Ridley 13710!.—DISTRIB. India (Khasia Hills, Nilgiris, Travancore), Ceylon, China, Malay Archipelago, Philippine Islands.

## Family CII. LAURACEÆ.

Erect aromatic trees or shrubs, or (*Cassytha*) leafless twining parasites, usually evergreen. *Leaves* alternate, rarely opposite or sub-opposite, gland-dotted, rarely lobed, the margins entire; stipules 0. *Flowers* regular, small, hermaphrodite or dioecious, in axillary or lateral cymes, clusters, racemes or panicles; bracts 0 or deciduous, often involucriform. *Perianth* usually inferior; tube short, often enlarging in fruit; lobes usually 6, sometimes more, biseriate, imbricate or subvalvate, equal or unequal, one row sometimes wanting, deciduous or persistent in fruit, sometimes enlarged as are often the pedicels. *Stamens* usually a multiple of the perianth-lobes, in 2—4 series on the tube; filaments flattened, those of inner staminal rows usually, of outer sometimes, furnished with a pair of glands; anthers erect, 2—4-celled, the cells dehiscing by upcurved, at length deciduous, valvular lids, the 4th row of stamens often reduced to staminodes: in ♀ flowers the stamens replaced by staminodes, usually linear or clavate, some biglandular as in ♂. *Ovary* sessile at the base of the perianth-tube, 1-celled; ovule solitary, anatropous, pendulous from the top of the cell. *Fruit* a dry or fleshy berry or drupe, naked or rarely enclosed in the perianth-tube or often supported by the more or less enlarged perianth-tube and lobes, the pedicel frequently thickened. *Seed* pendulous; testa membranous; albumen 0; cotyledons plano-convex, fleshy; radicle minute, superior.—*DISTRIB.* About 900—1000 species in the warmer regions of the world.

## Trees or shrubs

Stamens of 3rd row, when present, with extrorse anthers

Anthers 2-celled

Stamens of 3rd row present, those of 1st and  
2nd row introrse, if present

Stamens of 1st and 2nd rows present, all  
3 rows fertile

Fruit surrounded by the enlarged  
perianth (Tribe I. CRYPTOCARYÆ) 1. CRYPTOCARYA.

Fruit seated on the more or less  
enlarged perianth (Tribe II. APOL-  
LONIEÆ) .. ..

Perianth-segments equal, deci-  
duous in fruit; fruiting pedi-  
cels little or not enlarged .. 2. BEILSCHMIEDIA.

Perianth-segments unequal, the  
outer 3 smaller, persistent in

- fruit; fruiting pedicels much enlarged .. .. 3. DEHAASIA.
- Stamens of 1st and 2nd rows absent, of 3rd row sessile (Tribe III. ACRODILIDIEÆ) .. .. 4. ENDIANDRA.
- Stamens of 3rd row absent, those of 1st and 2nd row extrorse (Tribe IV. MICROPOREÆ) .. 5. MICROPORA.
- Anthers 4-celled; fertile stamens 9 (Tribe V. CINNAMOMEÆ)
- Leaves usually opposite or subopposite, rarely alternate, usually 3- or more ribbed; fruiting perianth-tube enlarged into a cupule embracing the fruit .. 6. CINNAMOMUM.
- Leaves alternate
- Fruiting perianth-tube enlarged
- Fruiting pedicels enlarged, very thick, usually warted; outer perianth-lobes equal to or slightly smaller than inner; anthers ovate-oblong, fairly large; glands large, glabrous like the inner side of the cordate staminodes .. 7. ALSEODAPHNE.
- Fruiting pedicels hardly enlarged; perianth lobes unequal, the 3 outer smaller than the 3 inner; anthers ovate-oblong, very small; glands villous; staminodes ovate, villous on both sides .. 8. NOTHAPHÈBE.
- Fruiting perianth-tube hardly enlarged
- Fruiting perianth-lobes reflexed .. 9. MACHILUS.
- Fruiting perianth-lobes erect, cup-like
- Fruiting pedicels short, not enlarged; anthers ovate-oblong; glands large, stipitate; staminodes cordate, stipitate .. 10. PHÈBE.
- Fruiting pedicels long, clavate; anthers triangular; glands small or absent; staminodes triangular, sessile .. 11. STEMMATODAPHNE.
- All stamens with introrse anthers, the lower cells sometimes lateral
- Anthers 4-celled (Tribe VI. LITSEÆ).
- Fertile stamens 9; involucre bracts deciduous in flower; leaves usually subverticillate, 3-ribbed or 1-ribbed, penninerved .. 12. ACTINODAPHNE.
- Fertile stamens normally 9 or 12, frequently more, rarely less; involucre bracts persist.



- tent in flower; leaves alternate or sub-opposite, penninerved .. .. 13. *LITSEA*.  
 Fertile stamens 6; involucre bracts early deciduous; leaves alternate or subverticillate, 3-ribbed.. .. 14. *NEOLITSEA*.  
 Anthers 2-celled (Tribe VII. *LAUREÆ*)  
 Fertile stamens usually 9 or 12; involucre bracts deciduous or not; leaves alternate or sub-opposite, penninerved or 3-ribbed.. 15. *LINDERA*.  
 Leafless filiform twining parasites with suckers; stamens with 4-celled anthers, outer two rows introrse, inner row extrorse (Tribe VIII. *CASSYTHÆ*) .. .. 16. *CASSYTHA*.

# Tribe I.—*CRYPTOCARYÆ*.

## 1. *CRYPTOCARYA*, R. Br.

Evergreen trees or shrubs. *Leaves* usually alternate, penninerved or 3-ribbed, more or less coriaceous. *Flowers* small, hermaphrodite, in axillary or subterminal pedunculate panicles. *Perianth*-tube turbinate or ovoid, after flowering constricted at the top; lobes 6, subequal. Perfect *stamens* 9, those of the 1st row introrse, opposite the outer 3 lobes of the perianth; those of the 2nd row introrse, opposite the 3 inner lobes; within and alternate with the stamens 6 stipitate glands; slightly within these again the 3 extrorse stamens of the 3rd row opposite the stamens of the 1st row; again, slightly within these, 3 stipitate cordate staminodes opposite the stamens of the 2nd row. *Ovary* sessile at the bottom of the perianth-tube in which it is enclosed; style shortly exserted; stigma obtuse or capitate. *Fruit* wholly enclosed in the perianth-tube which is accrescent, drupaceous, hardened or fleshy, smooth or ribbed, the mouth occluded, the limb deciduous or more or less persistent; pericarp membranous or thinly crustaceous, more or less free from the perianth-tube. *Seed* with a membranous testa often not separable from the pericarp; cotyledons thick, fleshy; radicle minute.—*DISTRIB.* Species about 40, tropical and subtropical, in both hemispheres.

I have followed Bentham (*Fl. Austral.* V. 294) and Koorders and Valetton (*Bijdr.* X. 211) in describing the glands as free and alternate with the stamens of the 1st and 2nd row instead of being attached to those of the 3rd. If a fully open flower is examined it will be seen that the glands are inserted between the stamens of the 2nd and 3rd rows. If such a flower is flattened out carefully and the staminodes and 3rd row stamens removed (they often come away together in a ring), the 6 outer stamens and the 6 glands alternate with

them will be easily apparent. The glands are slightly in front of the 6 outer stamens and slightly behind the 3 inner and the staminodes.

Leaves 3-ribbed (Sect. 1. *CARYODAPHNE*)

Leaves elliptic-ovate, coriaceous, over 7 cm. long, long-acuminate at apex, margins thin .. .. 1. *C. densiflora*.

Leaves orbicular-ovate, very coriaceous, under 7 cm. long, scarcely acute at apex, margins cartilaginous .. .. 2. *C. Wrayi*.

Leaves 1-ribbed, penninerved (Sect. 2. *EUCRYPTOCARYA*)

Leaves with the under surface conspicuously hairy and with net-venation prominent

Leaves usually large; panicles dense; flowers comparatively large

Leaves long-acuminate; bracts long, conspicuous; fruit ovoid-oblong .. .. 3. *C. Griffithiana*.

Leaves obtuse, emarginate or shortly acuminate; bracts small, inconspicuous; fruit ellipsoid .. .. 4. *C. crassinervia*.

Leaves moderate-sized, never over 15 cm. long and 7 cm. broad; panicles open; flowers small .. ..

Leaves elliptic, obtuse or shortly acuminate; fruit spherical, about 1.5 cm. in diameter .. .. 5. *C. impressa*.

Leaves oblong or oblong-lanceolate, acuminate; fruit ovoid-flask-shaped about 2 to 2.5 cm. long, 1.5 cm. broad .. .. 6. *C. rugulosa*.

Leaves with the under surface slightly hairy, becoming glabrous when old; net-venation fairly prominent .. ..

Leaves with under surface glaucescent, minutely puberulous; terminal panicles about 15 cm. long; fruit ovoid or ellipsoid, faintly ribbed, 25 mm. long, 18 mm. broad .. .. 7. *C. tomentosa*.

Leaves with under surface reddish, puberulous only when young; terminal panicles about 20 cm. long; fruit ovoid-oblong, 30-35 mm. long, 15 mm. broad .. .. 8. *C. ferrea*.

Leaves with the under surface quite glabrous; net venation not much raised

Leaves prominently bluish-glaucous beneath; panicles blackish-tomentose; bracts and bracteoles prominent, linear, up to 1 cm. long .. .. 9. *C. bracteolata*.

Leaves merely bluish or greyish beneath; panicles rusty-tomentose; bracts and bracteoles not prominent, small

Leaves 5 to 8 cm. broad or broader, obtuse at apex

Panicle elongate, 20-25 cm. long; transverse nervules of leaves prominent, distant .. .. 10. *C. Scortechinii*.

Panicles short, 10-15 cm. long; transverse nervules of leaves inconspicuous, very numerous and close .. .. 11. *C. areolata*.

Leaves scarcely 3-6 cm. broad, acuminate at apex.



- Panicles narrow; bracts of flowers minute;  
 main nerves of leaves 7—12 pairs .. 12. *C. Kurzii*.  
 Panicles spreading; bracts of flowers linear,  
 3 mm. long; main nerves of leaves 6—8  
 pairs .. .. 13. *C. casia*.

*Species imperfectly known* .. .. { 14. *C. enervis*.  
 .. .. 15. *C. Bubon-*  
 .. .. *gana*.  
 .. .. 16. *C. argentea*.

1. *CRYPTOCARYA DENSIFLORA*, Blume Bijdr. 556 (1825). A tree reaching 20 m. in height and 40 to 50 cm. in diameter; trunk thick, cylindric; bark reddish, smooth; branchlets dark brown, terete, rather stout, the uppermost somewhat angled and tawny-puberulous; buds lanceolate, tawny-puberulous. *Leaves* coriaceous, yellowish when dry; elliptic or elliptic-ovate, abruptly long-acuminate at apex, the acumen obtuse, attenuate at base; upper surface glabrous, shining, lower glaucous and glabrous, pruinose when fresh; 8—15 cm. long, 4—7 cm. broad; 3-ribbed from the base or up to 1 cm. above it, all impressed above, the side ribs only little fainter than the midrib, and extending sometimes half-way up, sometimes nearly to the acumen, or joined by loops to the main nerves of which usually only 1 to 2 curving pairs; transverse nervules few, irregular; nervules outside the side ribs about 4—5 looped together; reticulations finely areolately-netted; petiole stout, 10—15 mm. long. *Flowers* in axillary or terminal corymbose tawny-pubescent panicles much shorter than the leaves, usually 2—3 cm. in length and breadth; cymules dichotomous; bracts ovate, acute, caducous; bracteoles lanceolate; pedicels 1—5 mm. long or less. *Perianth*-tube turbinate, 1.5 mm. long, constricted at the mouth; lobes 2—2.5 mm. long, ovate, obtuse, sparsely villous within. *Stamens* of 1st and 2nd rows 1.5—2 mm. long, the connective produced in a rounded tip; filaments pubescent; those of 3rd row similar but more slender; staminodes ovate acuminate, glabrous in front, villous behind, 1.5 mm. long, stalk .5 mm.; glands glabrous, rounded, stipitate, .75 mm. long. *Ovary* and style narrowly subulate; stigma capitate. *Fruit* depressed-globose with a conical tip, 1.5—2 cm. long and rather more in diameter, ribbed and bossed when dry. *Seed* conform to the pericarp; testan membranous; cotyledons plane on the inner, rugose and rounded on the outer sides. Koord. and Val. Bijdr. X. 213. *Caryodaphne densiflora*, Nees Syst. Laur. 228; Miq. Pl. Jungh. 117 and Fl. Ind. Bat. I. i, 927; Meissn. in DC. Prodr. XV. i, 76.

PERAK: in forest near Larút, *King's Collector* 3605!, 5480!, 10684!—DISTRIB. Java, from 650 to 1500 m. alt.; Borneo (*Haviland* 3333!).

2. *CRYPTOCARYA WRAYI*, Gamble in Kew Bull. 142 (1910). A small tree; branchlets nearly black, minutely puberulous, somewhat angular, lenticellate; buds ovate-acuminate, tawny-puberulous. *Leaves* thickly coriaceous; ovate or orbicular-ovate, shortly and very bluntly acute at apex, truncate at base; upper surface glabrous, shining, lower glaucous and minutely puberulous; 5—7 cm. long, 4—5 cm. broad; 3-ribbed from about 5 mm. above the base with sometimes a minute pair from the base close to the cartilaginous margins, the midrib stout, depressed above, prominent beneath, extending to the apex, the side ribs curved to  $\frac{2}{3}$  or  $\frac{3}{4}$  of the way and with 3—5 outside nerves; main nerves 2—3 pairs from the midrib, curving upwards to and along the margin; transverse nervules many, arched, indistinct; reticulations minute, areolate on the lower surface; petiole stout, grooved above, 5—10 mm. long. *Flowers* in terminal or axillary rusty-pubescent panicles of cymes up to 3 cm. long, longer in fruit; the rhachis angular; pedicels very short scarcely 1—2 mm. long; buds clavate, 3 cm. long; bracts and bracteoles deciduous. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes as long as tube, orbicular, rusty-pubescent especially without, the throat of the tube rusty-villous. *Stamens* of 1st and 2nd rows with anthers triangular-ovate, the connective produced in an acute tip, 1.5 mm. long, villous on the rather stout filaments; those of 3rd row rather shorter, the tip more rounded; staminodes triangular acuminate, 1 mm. long, villous on the back, and shortly stipitate; glands glabrous, rounded, .5 mm. long with the short stalk. *Ovary* ovoid-cylindric, slightly villous, produced in a slender style and short capitate stigma. *Fruit* depressed-globose, glabrous, obscurely ribbed, with a short terminal cup of the bases of the perianth-lobes; 2 cm in diam., 1.5 cm. long. *Seed* conform to the fruit; testa membranous; cotyledons thick, the inner face nearly plane, outside rugose.

PERAK: at Gunong Bubu, Larút, 1500 m. alt., *Wray* 3853!

3. *CRYPTOCARYA GRIFFITHIANA*, Wight Ic. t 1830 (1852). A tree, reaching 15 to 25 metres in height and 25 to 75 cm. in diameter of stem; branchlets stout, densely rusty velvety-tomentose. *Leaves* coriaceous; oblong-lanceolate to oblong, long caudate-acuminate at apex, acute or cuneate, sometimes rounded at base; glabrous and

shining on the upper surface when mature except on the midrib which is rusty-tomentose, when young all rusty villous; lower surface glaucous and puberulous, between the densely rusty-tomentose midrib and prominent nervation; 20 to 30 cm. long, 5 to 10 cm. broad; midrib narrow above, broad and prominent below, densely tomentose; main nerves 8 to 12 pairs gracefully arching to and along the margin, deeply impressed above, prominently raised beneath, each pair joined almost horizontally by sub-parallel transverse nervules, also impressed above; petiole stout, 1 cm. long. *Flowers* subsessile, in dense crowded rusty-villous bracteate axillary and subterminal panicles up to 10 cm. long; bracts linear-lanceolate, usually 5 to 10 mm. long, one with two similar smaller bracteoles to each flower. *Perianth*-tube cylindric, slightly constricted at top, 2 mm. long, densely villous without; lobes ovate-oblong, 4 mm. long, densely rusty-villous. *Stamens* of 1st and 2nd row about 2 mm. long with villous filaments and ovate anthers, those of 3rd row rather longer, the connective produced at the top in an acute crest; staminodes of 4th row 1.5—2 mm. long, cordate, apiculate, glabrous in fruit, villous behind; glands shortly stipitate, 1 mm. long. *Ovary* narrowly ovoid, glabrous, glandular-dotted, attenuated into a slender style; stigma obtuse. *Fruit* when young ovoid-oblong, glabrous, obscurely ribbed, attenuated into a ring at top and the boss of the perianth-lobes, when old globose with a flask-shaped mouth 2 cm. long, 1 cm. in diam. *Seed* narrowly ovoid, attenuated into a beak; testa membranous, adherent to the persistent perianth tube; cotyledons thick, inside face plane; radicle conical. Kurz For. Fl. II. 295; Hook. f. Fl. Br. Ind. V. 117; Miq. Fl. Ind. Bat. I. i. 923; Brandis Ind. Trees 527. *C. infectoria*, Miq. var. *caudata*, Meissn. in DC. Prodr. XV. i. 68.

PERAK: at Ulu Bubong and Ulu Kerling, 100-200 m., *King's Collector* 8650!, 10173!, 10999!; hills at 250—300 m. alt., *King's Collector* 10794!; *Scortechini* 510!. SUNGAI UJONG: *Ridley* 2042! MALACCA: *Griffith* 4276!; *Maingay* (K. D.) 1249!; *Kurz* !; at Merliman, etc. *Holmberg* 860!, 890!; *Goodenough* 1568!. JOHORE: at Muar, Biawak, *Curtis* 3614!. SINGAPORE: at Changi, Selitar and Teban, *Ridley* 175!, 427!, 3382!.—DISTRIB. South Tenasserim.

4. CRYPTOCARYA CRASSINERVIA, Miq. Fl. Ind. Bat. I. i, 924 (1855). A tree, reaching a height of 20 to 25 m. and a diameter of stem of 35 to 60 cm.; branchlets stout, subtetragonously angled, densely rusty tomentose as are the inflorescences and the innovations, the hairs of the tomentum unequal. *Leaves* very coriaceous;

elliptic- or obovate-oblong, or oblong-oblancoelate, sometimes almost orbicular; obtuse, emarginate, sometimes mucronate or shortly acuminate at apex, rounded or slightly attenuate at base; margin usually recurved; upper surface shining usually conspicuously bullate, glabrous when mature except on the midrib and nerves; lower surface greyish-rusty-pubescent between the densely rusty tomentose nervation; 10—30 cm. long, 5 to 15 cm. broad; midrib very stout, scarcely raised or impressed on the upper, much raised on the lower surface; main nerves 5 to 10, impressed above, raised beneath, curving upwards to and along the margin and joined by prominent also impressed transverse nervules, and these again by reticulations; petiole stout, 1.5 to 2.5 cm. long. *Flowers* sessile, in stout dense much branched axillary and terminal panicles up to 10 or 15 cm. long; bracts thick, oblong or spatulate, about 4 mm. long, with 2 bracteoles 1 to 2 mm. long to each flower. *Perianth*-tube cylindric, densely rusty-tomentose, 2—5 mm. long; lobes about 4 mm. long, ovate, 3-nerved, grey, the outer slightly acute, tufted hairy near the tip and somewhat longer than the obtuse inner ones. *Stamens* of 1st and 2nd row about 2.5 mm. long, the filaments villous, those of 3rd row as long and with the connective crest-like; staminodes of 4th row cordate acuminate, obtuse at apex, hirsute on the back, 2 mm. long; glands large, 1.5 mm. long, glabrous, villous-stipitate. *Ovary* slender, ending in a long style and obtuse stigma; the young fruit prominently urceolate at first. *Fruit* ellipsoid, black, glabrous and smooth when ripe, ribbed when young, 2 cm. long by 1.5 cm. in diam. *Seeds* conform to the enlarged perianth-tube; testa membranous; cotyledons fleshy. Meissn. in DC. Prodr. xv. i. 69. *C. infectoria*, Miq. var. *β. acuminulata*, Meissn. in DC. Prodr. XV. i, 68.

PERAK: *Scortechini* 217!; at Maxwell's Hill, 1000 m., *Wray* 2962!; about Larút, on low ground and up to 350 m. *King's Collector* 2823!, 4448!, 4670!, 5129!, 5347!, 6037!, 6579!, 6719!, 7935!, 8396!; at Bruas, *Burn-Murdoch*!—DISTRIB. Sumatra (at Fort de Kock, *Teymann* Herb. Bog. 1007!), Borneo.

This species approaches rather nearly, as hinted by Meissner, to *C. Griffithiana*, but is distinguished by the usually very obtuse, short apiculate or even emarginate leaves, the ellipsoid fruit, the small bracts and the blunt staminodes. It is therefore considered best to maintain it separate, and the long series of specimens of either species with very little tendency to intermediate (*Wray* 2962 is the only one slightly so) seems to support the conclusion. *Burn-Murdoch* gives the Vernacular name "Medang miang."

##### 5. *CRYPTOCARYA IMPRESSA*, Miq. Fl. Ind. Bat. I. i, 923 (1855). A

large tree (Wray); branchlets rather stout, dark brown, the uppermost with the inflorescence and innovations densely finely rusty-tomentose. *Leaves* coriaceous; elliptic, shortly and sharply and abruptly acuminate at apex or sometimes obtuse, attenuate at base; dull and glabrous on the upper surface when mature except on the midrib which is raised and broad and rusty-tomentose, lower surface glaucous and puberulous between the densely rusty-tomentose midrib and prominent nervation; 7 to 15 cm. long, 3 to 7 cm. broad; main nerves 6 to 10 pairs, impressed above, much raised beneath, curved upwards to the margin and joined by subparallel transverse nervules, and these again joined by prominent reticulations; petiole very stout, 2 cm. long. *Flowers* subsessile, in spreading bracteate axillary panicles rarely longer than the leaves; bracts linear, about 2 mm. long, with 2 minute bracteoles. *Perianth*-tube turbinate, 1—5 mm. long, constricted at mouth; lobes ovate-oblong, about 2 mm. long, the inner 3 slightly smaller than the others. *Stamens* of 1st and 2nd row about 1 mm. long, the filaments villous; those of the 3rd row rather longer and with the connective produced in a broad crest; staminodes cordate, glabrous in front, villous behind; glands rounded, villous-stipitate. *Ovary* narrowly ovoid with a slight angle near the top, slightly villous; style slender; stigma briefly trifid; young fruit prominently urceolate and tomentose without. *Fruit* nearly spherical, blackish, puberulous, about 1.5 cm. in diam. Hook. f. Fl. Br. Ind. V. 117. *C. infectoria* Miq. var.  $\gamma$ . *opaca*, Meissn. in DC. Prodr. XV. i, 69.

PERAK: at Lower Camp, Gunong Batu Pateh, Wray 1126! MALACCA: Griffith! (K. D.) 4277!; Maingay (K. D.) 1250!. SINGAPORE: in garden jungle, Ridley 4821! or 4921!.—DISTRIB. Sumatra (at Paya Kombo, Teysmann!).

Wray's specimen has smaller leaves than usual, with more obtuse points at apex and less prominent nervation on the upper surface; but I see no reason to doubt it, for some even of Griffith's specimens come very near it.

6. *CRYPTOCARYA RUGULOSA*, Hook f. in Fl. Br. Ind. V. 118 (1886). A large tree, reaching 25 to 30 m. in height and a diameter of stem of 60 to 90 cm.; branchlets rather slender, firmly rusty pubescent. *Leaves* coriaceous; oblong or ovate-oblong or oblong-lanceolate, acute or acuminate at apex, cuneate at base; shining and glabrous above even on the nerves, finely rusty-pubescent beneath and greyish in the spaces between the nervules; 5—15 cm. long, 3—6 cm. broad; midrib stout, deeply impressed above, prominent beneath; main

elliptic- or obovate-oblong, or oblong-oblongeolate, sometimes almost orbicular; obtuse, emarginate, sometimes mucronate or shortly acuminate at apex, rounded or slightly attenuate at base; margin usually recurved; upper surface shining usually conspicuously bullate, glabrous when mature except on the midrib and nerves; lower surface greyish-rusty-pubescent between the densely rusty tomentose nervation; 10—30 cm. long, 5 to 15 cm. broad; midrib very stout, scarcely raised or impressed on the upper, much raised on the lower surface; main nerves 5 to 10, impressed above, raised beneath, curving upwards to and along the margin and joined by prominent also impressed transverse nervules, and these again by reticulations; petiole stout, 1.5 to 2.5 cm. long. *Flowers* sessile, in stout dense much branched axillary and terminal panicles up to 10 or 15 cm. long; bracts thick, oblong or spatulate, about 4 mm. long, with 2 bracteoles 1 to 2 mm. long to each flower. *Perianth*-tube cylindric, densely rusty-tomentose, 2—5 mm. long; lobes about 4 mm. long, ovate, 3-nerved, grey, the outer slightly acute, tufted hairy near the tip and somewhat longer than the obtuse inner ones. *Stamens* of 1st and 2nd row about 2.5 mm. long, the filaments villous, those of 3rd row as long and with the connective crest-like; staminodes of 4th row cordate acuminate, obtuse at apex, hirsute on the back, .2 mm. long; glands large, 1.5 mm. long, glabrous, villous-stipitate. *Ovary* slender, ending in a long style and obtuse stigma; the young fruit prominently urceolate at first. *Fruit* ellipsoid, black, glabrous and smooth when ripe, ribbed when young, 2 cm. long by 1.5 cm. in diam. *Seeds* conform to the enlarged perianth-tube; testa membranous; cotyledons fleshy. Meissn. in DC. Prodr. xv. i. 69. *C. infectoria*, Miq. var. *β. acuminulata*, Meissn. in DC. Prodr. XV. i, 68.

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nerves also impressed above and raised beneath, 5 to 10 pairs, curved upwards, and joined by subparallel transverse nervules also impressed above, and these again by a minute network of reticulations; petiole 1 cm. long, usually twisted. *Flowers* very small, pedicellate, in slender rusty pubescent much branched terminal or axillary leafy panicles about as long as the leaves; bracts at base of pedicel oblong, 1.5 mm. long, bracteoles 3 much shorter; pedicels .5 mm. long. *Perianth*-tube cylindrical, constricted at mouth, 1.5 to 2 mm. long; lobes ovate, obtuse, equal, as long as tube, nearly glabrous within. Stamens of 1st and 2nd row short, anthers ovate, filaments villous, connective glandular dotted; those of 3rd row obtuse, also dotted, and with rather large reflexed crest; staminodes of 4th row cordate acuminate, dotted, villous on the back, .75 mm. long; glands .5 mm. long, stipitate. *Ovary* narrowly ovate, attenuate into the style; stigma obtuse. *Fruit* black, glabrous, ovoid-flask-shaped, acute at apex, 2 to 2.5 cm. long, 1.5 cm. broad. *Seed* conforms to the fruit; testa membranous, dark brown; cotyledons very fleshy.

PENANG: at Muka Head; *Curtis* 958!. PERAK: Road to Bruas Dinding, *Ridley* 8359!; at Lumut Dinding, *Ridley* 10314!; dense forest about Larút at 150—300 m. alt., *King's Collector* 3749!, 5311!, 6279!. MALACCA: *Maingay* (K. C.) 1262!; *Hullett* 664!.

7. *CRYPTOCARYA TOMENTOSA*, Blume Mus. Bot. Lugd.-Bat. I. i, 335 (1851). A tree reaching a height of 15 to 20 m. and a diam. of 25 to 35 cm.; branchlets brown, rather stout, somewhat angular with prominent rather large lenticels, uppermost and innovations tawny-puberulous. *Leaves* chartaceo-coriaceous; elliptic or oblong-lanceolate, sometimes subovate, shortly acuminate at apex, cuneate attenuate or occasionally rounded at base; upper surface glabrous except on the midrib and main nerves, dull or slightly shining, lower glaucescent, tawny villous on the midrib and nerves minutely puberulous between them, ultimately almost or quite glabrous; 10—20 cm. long, 4—8 cm. broad; midrib stout, slightly impressed above, prominent beneath; main nerves 8 to 15, slightly raised on the upper surface, curving upwards to and along the margin and there sometimes joining in loops, secondary nerves occasional, transverse nervules subparallel, slender, moderately conspicuous as are the reticulations between them; petiole 1 cm. long, puberulous. *Flowers* pedicellate, in axillary or terminal branching grey- or tawny-pubescent panicles shorter than the leaves and about 10 cm. long if axillary, if terminal reaching 15 cm. or more; cymes spreading, corymbose;



bracts and bracteoles minute, caducous; pedicels 1 mm. long. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes as long, interior of flower only very slightly sericeous, quite as in *C. ferrea* as are the stamens and ovary. *Fruit* ovoid or ellipsoid, black, smooth, ribbed when young, faintly so when old, 25 mm. long, 18 mm. broad, apex truncate, depressed, the base rounded. *Seed* conform to the fruit, 15 mm. long, 10 mm. broad, depressed at apex; testa chartaceous; cotyledons fleshy. Miq. Fl. Ind. Bat. I. i, 923; Meissn. in DC. Prodr. XV. i, 71; Koord. and Val. Bijdr. X. 218. *C. glaucescens*, Hassk. Cat. Bog. 89.

PERAK: at Batu Kuran, *Scortechini*!; near Kinta river and elsewhere up to 160 m., *King's Collector* 5744!, 7050!, 7818!, 8776!.—  
DISTRIB. Java, Borneo.

var. *rugosa*, Gamble. Panicles with conspicuously rugose branches; leaves glabrous, petioles very thick, 1 to 1.5 cm. long.

MALACCA: at Sungei Hudang, *Derry* 1142! (*Ridley*).

This is a species of whose identification I have felt a little doubtful, the specimen sheets of true *C. tomentosa* at Kew and Calcutta being very few and consisting chiefly of rather young sprays. But I think, to judge from the Calcutta material, both from Java and Borneo, and from the descriptions, that I am right.

8. *CRYPTOCARYA FERREA*, Blume Bijdr. 557 (1825). A tree, reaching 15 to 20 m. in height and 25 to 35 cm. in diam.; branchlets stout, angular, rough and lenticellate, the ultimate ones and the inflorescence minutely rusty-pubescent. *Leaves* chartaceo-coriaceous; oblong or oblong-obovate, sometimes oblong-lanceolate, obtuse at tip with a short acumen, cuneate or alternate at base sometimes rounded; upper surface dull or slightly shining; glabrous, lower pale reddish or cinnamon-brown, puberulous only when young and on the nerves; 10—25 cm. long, 5—10 cm. broad; midrib stout, slightly impressed above, prominent beneath; main nerves 9 to 12, or sometimes 15 pairs, impressed slightly above, the lowest pair small and close to the margin, all gently curving to the margin and joined by prominent rather distant and irregular transverse nervules, which enclose a minutely netted reticulation; petiole 5—10 mm. long, rough, puberulous in young leaves. *Flowers* pedicelled, in axillary or terminal rusty-puberulous panicles, the axillary ones usually shorter than the leaves, the terminal reaching sometimes a length of 20 and breadth of 15 cm., branches spreading, cymes trichotomous; bracts and bracteoles small, ovate-lanceolate, caducous; pedicels about 1 mm.

long. *Perianth*-tube funnel-shaped, 1—5 mm. long; lobes ovate, equal or the inner slightly smaller, 2 mm. long, only slightly pubescent within. *Stamens* of 1st and 2nd series rounded at tip, filaments slightly sericeous, those of 3rd series usually acute at tip; glands subsessile, glabrous, alternate with the outer 6 stamens; staminodes of 4th row cordate acuminate very shortly villous-stipitate. *Ovary* slender, glabrous. *Fruit* ovoid-oblong, 3—3.5 cm. long, 1.5 cm. in diam., attenuate to the slightly truncate apiculate tip, black, smooth; pedicel clavate. Nees Syst. Laurin. 216; Miq. Fl. Ind. Bat. I. i, 921; Meissn. in DC. Prodr. XV. i, 69; Hook. f. Fl. Br. Ind. V. 119; Koord. and Val. Bijdr. X. 216. *C. oblongifolia*, Bl. l. c. 557.; Nees l. c. 215. *C. obscura*, Bl. in Mus. Bot. Lugd.-Bat. I. 335. *C. Mentek*, Bl. in Nees l. c. 218.

PENANG: at Pulau Boetong Reserve, *Curtis* 2739!. PERAK: about Larut up to 350 m. *King's Collector* 3909!, 5974!, 6166!, 8562!, 8708!, 8818!, 10976!. MALACCA: at Sungei Udang, *Derry* 425!; at Bukit Sidwan, *Pun Bebas* 131!; at Sungei Udang, *Good-enough* 1358!. JOHORE: Pmerong, *Canley* 8!. SINGAPORE: at Choa-chukang, *Ridley* 5996!, 8040!.—DISTRIB. Java.

Vern. 'Kayu Medang Kuning' (*Pun Bebas*); 'Medang Merah' (*Good-enough*). In reference to the doubt regarding the identification of this species given in the Fl. Br. Ind., I have compared the descriptions and available specimens of both the Peninsular and Archipelago species and believe it to be correct.

9. *CRYPTOCARYA BRACTEOLATA*, Gamble in Kew Bull. 143 (1910). A tree, reaching 18 to 24 m. in height and 40 to 50 cm. in diam.; branchlets terete, light brown, minutely grey-puberulous; innovations and upper branchlets, also the inflorescence, dark rusty-tomentose. *Leaves* coriaceous; ovate or elliptic, bluntly acuminate at apex, cuneate at base; upper surface dull or very slightly shining, glabrous except the midrib, lower surface bluish-glaucous, almost quite white when dry, the midrib and main nerves tawny-puberulous; 10—18 cm. long, 4—8 cm. broad; midrib rather slender, slightly impressed above; main nerves 6 to 8 pairs, the lowest from very near the base, curved upwards to and along the margin, joined by irregularly subparallel rather distant transverse nervules, and these again by the somewhat prominent reticulations; petiole 1—2 cm. long, twisted. *Flowers* in axillary or terminal long-bracteate blackish tomentose panicles much shorter than the leaves, the axillary ones rarely up to 5 cm. the terminal rather longer; bracts and bracteoles similar, linear, up to 1 cm.

long, the tip inrolled; pedicels 1—2 mm. long. *Perianth*-tube funnel-shaped, about 5 mm. long, thickened above; lobes oblong, rounded, 3—5 mm. long. *Stamens* of 1st and 2nd rows with rounded connective and villous filaments; those of 3rd row with connective acute; staminodes cordate-acuminate, penicillate at tip; glands rounded, prominently stalked. *Ovary* and style slender, glabrous; stigma capitate. *Fruit* black, glabrous, depressed-globose, 15 mm. long, 18 mm. in diam., tipped with a conspicuous apex. *Seed* conform with the fruit; testa membranous; cotyledons thick, hemi-spherical.

PERAK: in dense jungle near Larút, on hills from 150 to 450 m. alt., *King's Collector* 6732!, 7521!.

10. *CRYPTOCARYA SCORTECHINII*, Gamble in Kew Bull. 143 (1910). A tree reaching 18 to 24 m. in height and a diameter of stem of 40 to 50 cm., branchlets pale brown, angular, puberulous; innovations rusty pubescent. *Leaves* coriaceous; elliptic, elliptic-oblong or elliptic-lanceolate, obtuse or shortly acuminate sometimes long-acuminate at apex, attenuate at base; upper surface somewhat shining, glabrous, reticulate, lower purplish-grey or -glaucous also glabrous except sometimes for a slight pubescence on the midrib and main nerves; 10—20 cm. long, 5—10 cm. broad; midrib stout, slightly impressed above; main nerves 6 to 9 pairs, curving upwards to meet in loops near the margin and joined by a few irregular transverse nervules and a prominent reticulation, the nerves and reticulation slightly raised above; petiole stout, channelled above, 1—2 cm. long. *Flowers* shortly pedicelled, in axillary or terminal branched panicles reaching 20—25 cm. long, the branches nearly glabrous, the flowers minutely tawny-grey-pubescent; main peduncles about 6 cm. long; cymes spreading, ending in 2 pedicellate with 1 sessile flower; bracts and bracteoles ovate-lanceolate, acute, pubescent; pedicels 1 mm. long. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes ovate as long as tube, puberulous within. *Stamens* of 1st and 2nd series rounded at top, filaments villous; those of 3rd series narrower, broadly crested at top, filaments villous; staminodes of 4th row cordate acuminate, villous on the back; glands rounded, globose, shortly stipitate. *Ovary* lanceolate, globose, style slender. *Fruit* oblong-ellipsoid, truncate at tip, glabrous, 3 cm. long, 10—15 mm. in diam.; pericarp (enlarged perianth-tube) thick, rugose; pedicels much thickened, rusty-brown. *Seed* oblong, acute; testa membranous, cotyledons fleshy.

PERAK: at Thaiping, *Ridley* 2966!; at Gunong Haram, *Scortechinii*

568!, 619!; near Larút, up to 1500 m. alt., *King's Collector* 6281!, 6297!, 6298!, 6871!, 8686!, 10895!. SUNGAI UJONG: *Ridley* 5849 !.

In its leaves and inflorescence this species strongly resembles *C. Wightiana*, Thwaites, but in its fruit it is quite different; for that of *C. Wightiana* is globose and smooth and has not the very prominently enlarged pedicels. *Ridley's* 5849 has the perianth-tube longer than it is in the other specimens, but this is probably due to the flowers being on the verge of the fruiting stage.

11. *CRYPTOCARYA AREOLATA*, Gamble in Kew Bull. 144 (1910). A large tree, reaching 15 to 20 m. in height and 40 to 50 cm. in diam.; branchlets stout, angular, sparsely rusty puberulous and closely roughly lenticellate, innovations and inflorescence minutely rusty puberulous. *Leaves* coriaceous; ovate or elliptic ovate, the younger sometimes lanceolate, obtusely acute or rounded at apex, rarely acuminate, cuneate and often unequal at base; upper surface smooth, glabrous and somewhat shining, areolate-reticulate, lower glaucous, purplish when dry, glabrous except on the midrib and main nerves; 10 to 20 cm. long, 5 to 8 cm. broad; midrib moderately stout, flattened or somewhat keeled on the upper surface, prominent on the lower; main nerves 5 to 10 pairs, rather distant, the lowest pair close to the margin, all at first more or less straight and then curving to and along the margin, joined by many slender parallel transverse nervules scarcely more conspicuous than the elegantly areolate reticulations between them; petiole curved, 2 cm. long. *Flowers* subsessile, in axillary or terminal rusty-pubescent branching panicles of cymes, 10 to 15 cm. long; bracts and bracteoles ovate-lanceolate, early caducous. *Perianth*-tube cylindrical, 1.5 mm. long; lobes ovate, equal, 2.5 mm. long, pubescent within. *Stamens* of 1st and 2nd rows with villous filaments and broadly crested subacute connective 1—1.5 mm. long, those of 3rd row similar but longer and prominently crested; staminodes of 4th row sagittate, sharply acuminate, 1 mm. long, villous behind and at the base; glands large, rounded and glabrous, villous-stipitate. *Ovary* slender as is the style, slightly angled on one side near the top; stigma capitate. *Fruit* not known.

PERAK: at Sungie Larút, *Wray* 2456!; in open jungle on low-ground at 100—250 m., *King's Collector* 6017!, 6171!, 8630!.

12. *CRYPTOCARYA KURZII*, Hook. f. in Fl. Br. Ind. V. 119 (1886). A small tree reaching 10 to 12 m. in height and with stem 10 to 15 cm. in diameter; branchlets rather slender, terete, lenticellate, gla-

brous except the tawny-puberulous innovations. *Leaves* chartaceous; lanceolate or ovate-oblong or oblong-lanceolate, acuminate at apex, cuneate or acute or rounded at base; upper surface red-brown, shining or dull, glabrous except sometimes on the midrib, lower surface brown-glaucous or bluish-glaucous, sometimes minutely puberulous on the midrib and main nerves; 10—20 cm. long, 3—6 cm. broad; midrib fairly stout, slightly impressed above as are the 7 to 12 pairs of oblique main nerves which are joined by slender inconspicuous subparallel nervules and the minutely netted reticulation; petiole 1—1.5 cm. long, thickened, rugose, nearly glabrous. *Flowers* subsessile, in tawny-pubescent axillary or terminal panicles, the axillary curved and shorter than the leaves, the terminal usually somewhat elongate; bracts and bracteoles minute, caducous. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes ovate-acute or the inner rounded, sub-equal, sparsely golden-pubescent within, 2 mm. long. *Stamens* of 1st and 2nd rows 1.5 mm. long, connective produced in a membranous subacute tip, filaments villous; those of 3rd row similar but more slender; staminodes of 4th row cordate, acuminate, villous at back and on the short base, 1 mm. long; glands rounded, glabrous, .5 mm. long on villous stalks .25 mm. long. *Ovary* slender, glandular, glabrous; stigma capitate. *Fruit* urceolate when young, when old black, ovoid, acute, reaching about 1.5 cm. long and 1 cm. broad. *C. Wightiana*, *δ. Griffithii*, Meissn. in DC. Prodr. XV. 1. 70 (*excl. the Canara plant*). *C. ferrea*, Kurz For. Fl. II. 295 (*not of Blume*).

PERAK: at Thaipeng, *Wray* 2650; in dense jungle near Larút, *King's Collector* 3042!, 3901!, 5250!, 5320!, 5395!, 6083!, 6571!, 8469!. MALACCA: *Derry* 324!. SINGAPORE: *Chanchukang*, *Ridley* 3761!, 4134!, 5996!, 6158!.—DISTRIB. Tenasserim, Java, Borneo (*Haviland* 3082!, 3652!).

This species seems, by description, to be very near to *C. acutiflora*, Bl., but it does not agree with the only specimens of the latter that I have seen. I do not feel quite sure I am right in identifying the large available material as belonging to *C. Kurzii*, of which I have only seen two sheets at Kew (*Griffith* 4274 K.D. 1142); but I believe it is correct to do so. I have been a little in doubt about K.C. 6083 as to the possibility of its being the flowering form of *C. argentea*, but I think not.

13. CRYPTOCARYA CÆSIA, Blume Mus. Bot. Lugd.-Bat. I. 335 (1851). A tree; branchlets pale brown, slender, terete, softly tawny-velvety. *Leaves* chartaceous; ovate- or elliptic-oblong, long blunt acuminate at apex, attenuate, often unequally, at base; upper

surface dull, glabrous except on the midrib, lower surface glaucous or glaucescent, minutely puberulous when young, afterwards glabrous; 9—14 cm. long, 3—5 cm. broad; midrib moderately thick, impressed and keeled on the upper surface, prominent on the lower; main nerves 6—8 pairs, impressed above and slightly keeled, raised beneath, curved obliquely upwards to the margin and joined by rather indistinct irregular transverse nervules and a minutely netted reticulation; petiole 1 cm. long, moderately stout. *Flowers* in axillary or terminal tawny-pubescent panicles, the axillary shorter than the leaves, the terminal elongated; branches slender, cymules few-flowered; bracts linear, about 3 mm. long; bracteoles similar but smaller; pedicels none in central flowers, about 1 mm. long in lateral ones. *Perianth*-tube funnel-shaped, 1.5 mm. long; lobes as long, ovate, rounded at tip, slightly tawny-villous within. *Stamens* of 1st and 2nd rows with acute anther connectives and villous filaments; those of 3rd row similar and rather longer; staminodes cordate, acute, villous on the back; glands rounded, glabrous, the pedicel villous. *Ovary* and style slender, glabrous; stigma discoid. *Fruit* globose, smooth, 10—12 mm. in diam., pericarp fleshy. *Miq. Fl. Ind. Bat. I. 1. 925.*

MALACCA : at Sudang Reserve, *Derry* 1144!. SINGAPORE : *Chan-chukang* and *Bukit Mandai*, *Ridley* 4820!, 6665!.—DISTRIB. Java, Andaman Islands.

*Species imperfectly known.*

14. *CRYPTOCARYA ENERVIS*, Hook. f. in *Fl. Br. Ind. V.* 119 (1886). An evergreen tree (?); branchlets slender, black when dry, glabrous. *Leaves* thinly coriaceous; elliptic-lanceolate, caudate-acuminate at apex, acuminate at base; both surfaces glabrous, brownish green when dry, subglaucous and violet-brown beneath; 7—12 cm. long, 2—4 cm. broad; midrib slender, raised on the upper surface; main nerves 6—8 pairs, faint, curving upwards to and along the margin and there joining in diminishing slender loops; transverse nervules few, irregular, faint as are the reticulations; petiole slender, about 1 cm. long, bordered above by the decurrent margins of the blade. *Flowers* apparently in slender axillary panicles shorter than the leaves, the flowers themselves wanting. *Fruit* globose, smooth, 10—12 mm. in diam., faintly sulcate, tip short, obtuse.

MALACCA : *Griffith* K.D. 4336!

15. *CRYPTOCARYA BUBONGANA*, Gamble in *Kew Bull.* 144 (1910). A large tree, reaching 15 to 20 m. in height and 60 cm. in diam. of



stem; branchlets stout, angular, dark brown, uppermost minutely puberulous. *Leaves* coriaceous; elliptic or elliptic-oblong, shortly acuminate at apex, attenuately rounded often unequally at base; glabrous on both surfaces, dull on the upper; 10—16 cm. long, 3—6 cm. broad; midrib very stout, slightly impressed and keeled on the upper surface, very prominent on the lower; main nerves 6 to 9 pairs, slightly impressed above, very prominent beneath, curved gradually upwards to and along the margin and joined by very slender close subparallel transverse nervules and minutely netted reticulation; petiole curved, slightly puberulous, 10 to 15 mm. long. *Panicles* lateral, few-flowered, stout, shorter than the leaves. *Flowers* not known. *Fruit* globose, glabrous, dark green, black when dry, 10—12 mm. in diameter.

PERAK: open mixed jungle on Ulu Bubong at 150 to 250 m. *King's Collector* 10570!

16. *CRYPTOCARYA ARGENTEA*, Gamble in Kew Bull. 144 (1910). An evergreen tree reaching 15 to 20 m. in height and 37 to 50 cm. in diam. of stem; branchlets slender, pale brown, lenticellate, the uppermost minutely puberulous. *Leaves* coriaceous, often bullate; oblong or oblong-lanceolate, shortly obtusely acuminate at apex, cuneate at base; upper surface bright green when fresh, brown when dry, shining, glabrous, lower silvery-grey when fresh, bluish-glaucous when dry, the nerves puberulous; 8—15 cm. long, 3—6 cm. broad; midrib rather slender, strongly impressed above; main nerves 8—10 pairs, slightly impressed above, curved to near the margin and then meeting in a small loop, joined by irregular transverse nervules and an obscure reticulation; petiole slender, 9—12 cm. long, black when dry. *Flowers* in axillary or terminal slender panicles reaching about 6 cm. in length; only young fruit (ellipsoid, faintly ribbed) known.

PERAK: in dense jungle at 90—180 m. alt., *King's Collector* 7966!

This species comes near to *C. Kurzii*, Hook. f.

## Tribe II. APOLLONIEÆ.

### 2. BEILSCHMIEDIA, Nees.

Evergreen trees or shrubs. *Leaves* alternate or opposite, usually coriaceous, penni-nerved, venose-reticulate. *Flowers* usually small, hermaphrodite, axillary lateral or subterminal, racemose or panicled.

*Perianth*-tube short; lobes 6, subequal, deciduous after flowering. *Stamens* 9 perfect, with 2-celled anthers, those of the 1st and 2nd rows introrse; those of the 3rd extrorse; staminodes of the 4th row cordate or ovoid, often concave in front, shortly stipitate; glands 6, stipitate, nearly as large as the staminodes, between the 2nd and 3rd row of stamens and rather nearer the latter with which they often come away though not attached to the filaments. *Ovary* sessile, free from the perianth, attenuate into the style; stigma obtuse. *Fruit* an oblong ovoid or globose berry; pedicels not or only thickened below, little at the perianth-ring; perianth quite deciduous leaving a narrow ring; cotyledons fleshy with often a rudimentary dissepiment between them, sometimes ruminant.—**DISTRIB.** About 20 species, all tropical.

Leaves very coriaceous, brown when dry, 20—35 cm. long,

7—12 cm. broad; flowers in panicles over 10 cm. long.

Leaves oblong, perianth-lobes ovate, 1—5 mm. long;  
stamens short. . . . .

1. *B. insignis*.

Leaves obovate, perianth-lobes oblong, 4 mm. long;  
stamens rather long . . . . .

2. *B. Kunstleri*.

Leaves coriaceous, greenish above when dry, 10—20 cm.  
long, 3—10 cm. broad; flower panicles mostly under  
10 cm. long.

Leaves alternate; flowers rather large; perianth-  
lobes 3 mm. long.

Leaves glabrous on the reddish brown under  
surface; perianth-tube flattened. . . . .

3. *B. malaccensis*.

Leaves villous on the purplish under surface;  
perianth-tube conical . . . . .

4. *B. Curtisii*.

Leaves subopposite, rusty-villous; flowers rather  
large, in panicles 12 cm. long; perianth-lobes  
2.5 cm. long . . . . .

5. *B. Scortechinii*.

Leaves opposite; panicles subglabrous, very slender,  
up to 6 cm. long; flowers very small. . . . .

6. *B. lumutensis*.

Leaves thinly coriaceous or chartaceous, alternate or  
subopposite.

Flower-panicles dense, under 4 cm. long; perianth-  
lobes 3 mm. long; leaves reddish-brown when dry

7. *B. Maingayi*.

Flower-panicles spreading, 10—14 cm. long.

Leaves usually shining, greenish on upper sur-  
face when dry; main nerves regular, parallel;  
panicles grey . . . . .

8. *B. longipes*.

Leaves usually dull, reddish-brown on upper  
surface when dry; main nerves irregular; pani-  
cles reddish . . . . .

9. *B. perakensis*.



- Flowers in very short bracteate racemes; perianth-lobes 1 mm. long; leaves reddish-brown when dry; branchlets white .. .. 10. *B. penangiana*.

*Species imperfectly known.*

- Leaves membranous, elliptic or elliptic ovate; fruit up to 15 mm. long .. .. 11. *B. membranacea*.  
 Leaves chartaceous, lanceolate or oblong-lanceolate; fruit up to 25 mm. long .. .. 12. *B. pahangensis*.  
 Leaves coriaceous, lanceolate or oblong-lanceolate; fruit 35 mm. long .. .. 13. *B. Foziana*.

1. *BEILSCHIMEDIA INSIGNIS*, Gamble in Kew Bull. 147 (1910). A medium-sized tree, reaching 15 to 20 m. in height and 45 to 60 cm. in diameter of stem; branchlets dark brown, stout, glabrous, lenticellate; buds slender up to 1 cm. long with glabrous lanceolate scales. *Leaves* very coriaceous, opposite or alternate; oblong or oblong-ob lanceolate, acute at apex, attenuate at base; both surfaces glabrous, shining, olive-brown when dry; 20—35 cm. long, 7—12 cm. broad; midrib stout, slightly impressed above, keeled beneath when dry; main nerves 10 to 15 pairs slightly impressed above and raised beneath, starting at 50° to 60° with the midrib and curving up to and along the margin where they end in gradually diminishing small loops between the angular transverse nervules, these and the net venation being raised and well marked on the under, less so on the upper surface; petiole stout, channelled above, 20—25 mm. long. *Flowers* in slender axillary panicles up to 12 cm. long; rhachis glabrous, flattened; branches slender with few- (2—3-) flowered cymules; pedicels slender, 2 mm. long. *Perianth*-tube cup-shaped, 1 mm. long; lobes ovate, obtuse, 1.5 mm. long, glabrous on both sides except a slight ring below the stamens. *Stamens* of 1st and 2nd rows 1.5 mm. long, filaments broad, slightly white-villous, connective rounded at apex; stamens of 3rd row similar but longer and rather more slender, the 2 basal glands broad, obtuse, stipitate; staminodes of 4th row cordate, acuminate, concave in front, slightly villous behind, rather longer (.75 mm.) than the glands. *Ovary* ovoid, narrowed into a short style; stigma somewhat bifid. *Fruit* globose, reddish-brown to black, rough, 3—4 cm. in diam., shortly apiculate, the basal ring of the fallen perianth very narrow.

**PERAK**: in dense jungle on low ground under 30 m. above sea-level, *King's Collector* 6615 !, 8479 !.

2. *BEILSCHMIEDIA KUNSTLERI*, Gamble in Kew Bull. 147 (1910). A large tree, reaching 24 to 30 m. in height and 60 cm. or more in diam. of stem; branches very stout, 1—2 cm. in diam. at the top; bark corky, rough, with prominent leaf-scars; leaf-buds thick, ovoid, scales ovate and rusty-puberulous. *Leaves* very coriaceous, opposite or alternate; obovate or obovate-oblong, rounded or obtusely acute at apex, long cuneate or attenuate at base; both surfaces glabrous, shining, prominently reticulate; margins recurved; 25—35 cm. long, 9—12 cm. broad; midrib stout, impressed on the upper, much raised on the lower surface; main nerves 10—12 pairs, irregular, impressed above, sharply raised beneath, starting at 40°—50° with the midrib and gently curving to and along the margin where they meet in irregular loops; secondary nerves and transverse nervules prominent, irregular as is the prominently raised reticulation; petiole very stout, rough, puberulous, 1.5—2.5 cm. long. *Flowers* velvety dark red, in axillary branching slightly puberulous panicles up to 20 cm. long; the rachis angular flattened as are the branches; pedicels slender, 1—2 mm. long. *Perianth*-tube very short, flattened; lobes oblong, obtuse, glandular, 4 mm. long, glabrous except a ring below the stamens. *Stamens* of 1st and 2nd rows slender, 2—2.5 cm. long, filaments villous, connective acute, anther cells elongate; those of 3rd row similar, the 2 basal glands rounded stipitate, .5 mm. long; staminodes of 4th row cordate, acuminate, stipitate, concave in front, slightly villous behind, 1 mm. long. *Ovary* ovoid, gradually attenuate into a rather slender style; stigma obtuse. *Fruit* (young only) obovoid, rugose, glabrous, apiculate, the ring of the fallen perianth-lobes pale, undulate.

PERAK: in dense jungle on low ground near Larút, *King's Collector* 6854!. SINGAPORE: at Bukit Timah, *Bayliss* 5885!.

3. *BEILSCHMIEDIA MALACENSIS*, Hook. f. in Fl. Br. Ind. V. 123 (1886). A tree; branchlets stout, shining, lenticellate, uppermost angular, innovations and leaf-buds dark purplish rusty-pubescent; buds ovate-lanceolate. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong, obtuse or acute at apex, attenuate often unequally at base; both surfaces glabrous, upper greenish-brown when dry, paler along the nerves, moderately shining, lower reddish-brown; 12—20 cm. long, 6—10 cm. broad; midrib prominent beneath, slightly raised above; main nerves 8 to 12 pairs, slightly depressed above, very prominent beneath, starting at an angle of about 60° with the midrib and curving to and along the margin, the upper ones joining

in prominent loops; secondary nerves often prominent, branching into the prominently widely netted reticulations which are raised on both surfaces when dry; petiole very stout, rough, 1—2 cm. long. *Flowers* in axillary panicles up to 6 cm. long, usually ascending, the peduncle and divaricating branches stout, purplish rusty-pubescent, often flattened; bracts ovate-oblong, caducous; pedicels stout, densely purplish pubescent, 2—3 mm. long; in young fruit the scar of the fallen perianth making a white ring. *Perianth*-tube very short, spreading, flattened; lobes linear oblong, 3 mm. long, sparsely purplish-villous within. *Stamens* slender, those of the outer rows linear, 2 mm. long, pubescent; those of the inner row similar but slightly longer, the glands cordate, .75 mm. long; staminodes also cordate on pubescent filaments, 1—1.5 mm. long. *Ovary* conoidal, glabrous; style slender; stigma small, capitate. *Fruit* not seen. *B. Roxburghiana*  $\beta$ ? *malaccensis*, Meissn. in DC. Prodr. XV. i. 63.

MALACCA: Griffith!; Maingay K. D. 1260!. SINGAPORE: at Bukit Timah, Ridley 4424!

4. *BEILSCHMIEDIA CURTISII*, Gamble in Kew Bull. 148 (1910). A tree, reaching 15 to 20 m. in height; branchlets very stout, densely dark rusty-tomentose; leaf-buds ovoid with pale tomentum on the few scales. *Leaves* coriaceous, alternate; elliptic, rounded at apex with a very short acuminate point, rounded or obtusely acute at base; upper surface shining, olive green when dry, glabrous except on the midrib and main nerves, lower surface dark reddish-brown, rusty-villous throughout, tomentose on the nerves; margins recurved; 15—30 cm. long, 8—13 cm. broad; midrib stout, impressed and often keeled above, prominent beneath; main nerves 10 to 12 pairs, impressed above, prominently raised beneath, leaving the midrib at about 60° and only slightly curving to very close to the margin where they, at any rate the uppermost, join in loops; secondary nerves few, short; transverse nervules rather irregular and distant; reticulations visible on the upper surface as a prominently raised network; petiole very stout, rusty-tomentose, 2—3 cm. long. *Flowers* in short axillary rusty-tomentose corymbose panicles up to about 2.5 cm. long, elongating in fruit; bracts ovate, obtuse, caducous; pedicels rather slender, 1.5—2 mm. long. *Perianth*-tube obconical; lobes ovate or oblong, the outer slightly the larger, prominently rusty hispid-villous, 3—3.5 mm. long. *Stamens* slender, those of the outer rows 1.5—2 mm. long, obtuse, the cells oblong, the filaments villous; those of the third row rather longer but similar, the glands

very short, cordate; staminodes cordate, 1 mm. long, very shortly villous-stipitate. *Ovary* conoidal, glabrous; style slender; stigma small, capitate. *Fruit* oblong or obovoid, nearly black, smooth, 25 mm. long, 12—15 mm. broad, supported by the very narrow ring of the fallen perianth, the pedicels thickened to 3 mm. in diam.; pericarp woody.

PENANG: on Government Hill at 600 m. alt., *Curtis* 1015!; SINGAPORE: in garden jungle, *Ridley* 8075!

5. *BEILSCHMIEDIA SCORTECHINII*, Gamble in Kew Bull. 148 (1910). A tree; branches stout, their bark dark brown, rough, with large lenticels; branchlets stout, flattened, rusty-pubescent; buds lanceolate, rusty pubescent, 7 mm. long. *Leaves* coriaceous, sub-opposite; oblong-lanceolate, longitudinally folded when young, acuminate at apex, attenuate at base; upper surface glabrous except the midrib, lower rusty-puberulous when young, afterwards glabrescent but still rusty-brown; 12—20 cm. long, 3—5 cm. broad; midrib very stout, scarcely raised on the upper, very much so on the lower, surface; main nerves about 12 pairs, at an angle of about 60° with the midrib, gently curved to join in diminishing loops near the margin; reticulations irregular, very prominent, netted and raised on the upper surface; petiole very stout, rusty-pubescent, 1.5—2.5 cm. long. *Flowers* in axillary rusty-pubescent few-branched panicles reaching 12 cm. long and about 6 cm. broad; peduncle about 6 cm. long, those of branches about 2 cm.; all branches stout and often flattened; pedicels 2 mm. long; bracts and bracteoles very small, caducous; flower-buds globose. *Perianth*-tube campanulate, 1.5 mm. long; lobes oblong, 2.5 mm. long, rusty-villous within. *Stamens* of 1st and 2nd rows stout, 2 mm. long, filaments pubescent, connective obtuse or emarginate at apex; stamens of 3rd row as long as the others but more slender, emarginate at apex, their 2 basal glands rather large cordate stipitate; staminodes of 4th row cordate obtuse, concave in front, pubescent behind, scarcely larger than the glands. *Ovary* puberulous, style rather slender; stigma obtuse. *Fruit* not known.

PERAK: at Caulfield's Hill, 1220 m. alt., *Scortechini* 483! 493!.

6. *BEILSCHMIEDIA LUMUTENSIS*, Gamble in Kew Bull. 148 (1910). An evergreen tree (?); branchlets slender, glabrous, reddish-brown; buds linear, glabrous. *Leaves* coriaceous, opposite, prominently reticulate; elliptic to elliptic-oblong, acute at apex, attenuate at base;

both surfaces glabrous, shining, olive-brown when dry; 10—14 cm. long, 4—6 cm. broad; midrib rather slender, slightly impressed above, raised beneath; main nerves 8—10 pairs, the lowest quite close to the margin, at about  $65^{\circ}$  with the midrib, curved to anastomose near the margin and joined by an irregular prominent network of reticulation, all raised on both surfaces; petiole 7—12 cm. long, reddish. *Flowers* in axillary glabrous panicles of 4—5 slender elongate branches from a short (about 2—3 mm. long) thick peduncle which sometimes bears leafy branches; the branches 4—6 cm. long, ending in few-flowered cymes; pedicels slender; buds globose; flowers very small, subglabrous. *Perianth*-tube campanulate, glabrous, gland dotted; lobes short, ovate or nearly orbicular, glabrous except for a narrow villous ring at the base of the stamens, tube and lobes together about 1.5 mm. long. *Stamens* of 1st and 2nd row about 1 mm. long, connective acute; those of 3rd row similar, the 2 basal glands rather large; staminodes of 4th row cordate, stipitate, all glabrous, or the filaments slightly villous. *Ovary* ovoid, glabrous, tapering into a short style; stigma obtuse. *Fruit* not known.

PERAK: at Lumut Dinding, Ridley 10323!

7. BEILSCHMIEDIA MAINGAYI, Hook. f. in Fl. Br. Ind. V. 123 (1886). A tree: branchlets very stout, the pale brown corky bark marked by longitudinal clefts, prominent leaf scars and very large round lenticels; leaf-buds ovoid with densely rusty-tomentose scales. *Leaves* chartaceous, subopposite, often folded longitudinally; obovate or oblanceolate, abruptly acuminate at apex, narrowly acuminate at base; both surfaces glabrous, reddish-brown when dry; 12—24 cm. long, 4—14 cm. broad; midrib stout, impressed above and keeled; main nerves 7—9 pairs, distant, not very prominent, starting at  $60^{\circ}$  or less (lowest pair  $30^{\circ}$ ) with the midrib and curving to the margin and along it and joined together by irregular branches and diminishing loops; reticulations irregular, prominent and slightly raised on both surfaces; petiole stout, curved, 1—2.5 cm. long. *Flowers* in dense axillary rusty-tomentose panicles up to 4 cm. long and 3—4 cm. broad; rachis and branches stout, usually flattened; bracts many, conspicuous, ovate, obtuse, densely rusty-tomentose, about 6—8 cm. long; bracteoles small; pedicels very short; buds cordate-globose. *Perianth*-tube very short; lobes ovate, broad, 3 mm. long, villous within. *Stamens* of 1st and 2nd row 1.5 mm. long, filaments thick, flattened, puberulous, anther-cells oblong, apex of connective obtuse; those of 3rd row similar but rather more acute

and 2.5 mm. long, the 2 glands close behind their bases large ovoid, glabrous, shortly stipitate; staminodes of 4th row ovate, obliquely acuminate, concave in front, densely pubescent behind, 1.5 mm. long. *Ovary* ovoid, sparsely villous; style elongate; stigma obtuse. *Fruit* not known.

PERAK: at Gunong Haram, *Scortechini* 727!; at Lumut, *Ridley* 3104!. MALACCA: Maingay K. D. 1268!

King's Collector 4554! and 5445! from Goping, Perak, 150—300 m. alt., may be fruiting specimens of this species. The leaves are rather smaller but have much the same texture and nervation. Should it prove to be so, the following must be added to the description:

*Fruit* ellipsoid-obovoid, 2.5—3.5 cm. long, 1.5 cm. in diam., somewhat acute at apex with an oblique tip, nearly black, smooth; pedicels enlarged to 5 mm. in diam., rusty-pubescent, ending in the much less enlarged ring of the fallen perianth; pericarp thick, granular.

Wray 1069! from lower Camp, Gunong Batu Pateh, Perak, is also, in all probability, a specimen of the fruit of a species of *Beilschmiedia* near to *B. Maingayi*. It may thus be characterized.

"A small tree; branchlets stout, dark-brown; buds glabrous, lanceolate, 1 cm. long. *Leaves* elliptic or elliptic-oblong, chartaceous, acute at apex, but usually sphacelate, narrowed at base; both surfaces glabrous; 12—20 cm. long, 5—6 cm. broad; main nerves 8—10 pairs, not very prominent, reticulations prominent on both surfaces; petiole 1—2 cm. long, twisted. *Fruit* oblong, oblique, obtuse at apex, up to 6 cm. long and 2 cm. in diam., the pericarp ferruginously rough, scurfy; pedicel greatly thickened." It cannot be named until the flowers are known.

8. *BEILSCHMIEDIA LONGIPES*, Hook. f. in Fl. Br. Ind. V. 123 (1886). A tree, reaching 15 to 20 m. in height and 40 to 50 cm. in diameter of stem; branchlets ashy-grey, longitudinally ribbed when dry, lenticellate; innovations and lanceolate leaf-buds ashy-grey-puberulous, the latter with few deciduous scales. *Leaves* thinly coriaceous, alternate; elliptic-lanceolate or -oblanceolate, acuminate usually cuspidately at apex, cuneate at base; upper surface shining, glabrous, often olive-green when dry, lower surface ashy-grey or rusty-pubescent, finally glabrate; 15—27 cm. long, 5—10 cm. broad; midrib rather slender, impressed above, raised beneath; main nerves 10—14 pairs, very prominent beneath, at an angle of 40° to 45° with the midrib, at first straight, then curving near the margin, all or only the upper ones joined in loops; transverse nervules and reticulations irregular, usually prominent on the upper surface; petiole stout, 12—20 mm. long. *Flowers* in lax elongate ashy-pubescent panicles reaching 10—13 cm. in length and 5 cm. in breadth; branches few,



alternate, distant, at right angles to the rhachis, bearing few-flowered cymules; bracts linear, short; pedicels 1 mm. long on side flower, 0 in central flowers; flowers yellow. *Perianth*-tube cupshaped, 1—5 mm. long; lobes ovate, rounded, densely grey tomentose without, puberulous within, as long as the tube. *Stamens* of 1st and 2nd rows 1.5 mm. long, filaments puberulous, anthers ovate, connective acute; those of 3rd row more slender and rather shorter, with 2 orbicular stipitate glands a little behind; staminodes of 4th row small, cordate, very shortly stipitate. *Ovary* glabrous; style short; stigma obtuse. *Fruit* (very young only) ovoid, glabrous, apiculate, the scar of the fallen perianth pale.

PERAK: at Sungie Larut, *Wray* 2291!; *Scortechini*!; forests near Larut chiefly on limestone, at 150 to 450 m. elevation, *King's Collector* 3859!, 4765!, 5465!, 5903!, 7238!, 7325! MALACCA: *Main-gay*, K. D. 1248!

9. *BEILSCHMIEDIA PERAKENSIS*, Gamble in Kew Bull. 149 (1910). A shrub or small tree reaching 9—12 m. in height and 12—25 cm. in diam. of stem; branchlets slender, dark brown, sparsely pubescent; innovations densely tawny-pubescent as are the ovoid leaf-buds about 5 mm. long. *Leaves* chartaceous, membranous when young, alternate; elliptic or elliptic-obovate, shortly acuminate at apex, cuneate or attenuate at base; upper surface glabrous except on the midrib and main nerves, lower minutely puberulous especially on the nerves, at length nearly glabrous; both surfaces dull when dry, reddish brown; 8—15 cm. long, 4—7 cm. wide; midrib moderately stout, slightly impressed above, raised beneath; main nerves 10 to 12 pairs, usually irregular, starting at about 50° with the midrib and curved to the margin where they connect in loops, joined by rather prominent transverse nervules and reticulations which are conspicuous on the upper surface; petiole stout, densely pubescent, 5—10 mm. long. *Flowers* in slender axillary rusty-pubescent panicles reaching 10—14 cm. in length and scarcely 4 cm. in breadth; peduncle usually long; branches few, generally at right angles to the rhachis; cymules about 3-flowered; bracts and bracteoles linear; pedicels slender, of middle flower almost 0; *Perianth*-tube very short; lobes ovate, obtuse or slightly ovate, 1.5 mm. long. *Stamens* of 1st and 2nd rows slender, 1 mm. long, filaments puberulous, connective rounded; those of 3rd row similar but rather longer, the 2 basal glands ovoid, stipitate; staminodes of 4th row ovate, acute, rather small. *Ovary* oblong; style stout; stigma obtuse. *Fruit* oblong or obovoid, black



when dry, 12—15 mm. long, 7—8 mm. broad; pericarp thick; cotyledons separated by a false dissepiment; pedicels scarcely enlarged; ring of fallen perianth pale.

PERAK: *Scortechini*!; dense jungle on hills at 150—250 m. alt., *King's Collector* 8489!, 10026!, 10432!.

10. *BEILSCHMIEDIA PENANGIANA*, Gamble in Kew Bull. 149 (1910). An evergreen tree, reaching 10—12 m. in height; branchlets white with smooth shining bark, lenticels oblong; buds perulate. *Leaves* subcoriaceous, alternate or subopposite; elliptic or elliptic lanceolate, very obtusely acuminate at apex, acuminate at base; both surfaces glabrous, reddish-brown when dry, upper shining; 7—10 cm. long, 3—4 cm. broad; midrib broad, depressed on the upper surface; main nerves 10—12 pairs, irregular, much branched and joining in loops well within the margin, prominent on both surfaces; transverse nervules also prominent, branched, enclosing the obscure reticulation; petiole broad, .5—1 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* in very short axillary bracteate racemes, the buds strobilate with orbicular fimbriate much gland-dotted slightly puberulous bracts, each enclosing one flower supported by two lanceolate acuminate fimbriate bracteoles 1.5 mm. long, the bracts and bracteoles afterwards caducous; pedicels thick. *Perianth*-lobes ovate, obtuse, ciliate, gland-dotted, 1 mm. long, sub-equal. *Stamens* of 1st and 2nd row 1 mm. long, glabrous, on thick filaments; those of 3rd row similar with a pair of suborbicular stipitate glands close to the bases of the filaments; staminodes of 4th row cordate, very shortly stipitate, .5 mm. long. *Ovary* globose, glabrous; style short; stigma obtuse. *Fruit* not known.

PENANG: at Penara Bukit at 300 m. alt., *Curtis* 1098!

*Species imperfectly known.*

11. *BEILSCHMIEDIA MEMBRANACEA*, Gamble in Kew Bull. 150 (1910). A small tree, reaching 4 to 6 m. in height and the stem 7 to 15 cm. in diameter; branchlets slender, grey, softly blackish-puberulous, innovations rusty-tomentose, as are the small ovoid buds. *Leaves* membranous, alternate; elliptic or elliptic-ovate, obtusely acute at apex, attenuate or slightly and unequally rounded at base; both surfaces olive-green when dry, somewhat shining, glabrous except on the midrib and main nerves; 10—15 cm. long, 5—8 cm. broad; midrib slender, raised on both surfaces; main nerves 9 to 11 pairs, starting at

an angle of about  $45^{\circ}$  with the midrib and curving to near the margin where they anastomose in irregular loops; reticulations irregularly netted, raised and prominent on both surfaces; petiole thick, pubescent, 5—10 mm. long. *Flowers* not known, apparently in very short axillary cymes. *Fruit* oblong, smooth, up to 15 mm. long and 7 mm. in diameter; pedicel scarcely enlarged.

PERAK: in open jungle at 600 to 900 m. alt., *King's Collector* 10,928!

12. *BEILSCHMIEDIA PAHANGENSIS*, Gamble in Kew Bull. 150 (1910). A tree; branches slender, greyish-brown; branchlets dark brown, glabrous, lenticellate; leaf-buds very small, ovoid with grey-puberulous scales. *Leaves* chartaceous, alternate; lanceolate or oblong-lanceolate, obtusely acute at apex, long-attenuate or -cuneate at base; both surfaces glabrous, prominently reticulate, upper shining; 10—15 cm. long, 3—5 cm. broad; midrib rather slender, slightly raised on both surfaces; main nerves irregular, 10—12 pairs, usually at about  $45^{\circ}$  with the midrib, at first straight then branching to anastomose near the margin; nervules and reticulations irregular, prominently raised on both surfaces; petiole slender, 1—2 cm. long, rugose. *Flowers* not known, in axillary panicles up to about 6 cm. long; rhachises slender. *Fruit* ellipsoid, obtuse at both ends, blackish with raised pale spots on tubercles, 2—2.5 cm. long, 1 cm. broad; cotyledons very fleshy, the false dissepiment membranous.

PAHANG: at Kwala Triang and Suboo Lanjoot, *Ridley* 2273!

13. *BEILSCHMIEDIA FOXIANA*, Gamble in Kew Bull. 150 (1910). An evergreen tree (?); branchlets smooth, thick, lenticellate, greenish-brown. *Leaves* coriaceous, subopposite, prominently reticulate; lanceolate or oblanceolate, bluntly acuminate at apex, long-cuneately narrowed at base; both surfaces dull, glabrous; margin slightly recurved; 12—16 cm. long, 5—7 cm. broad; midrib stout, slightly raised above; main nerves 7 pairs at from  $40^{\circ}$ — $50^{\circ}$  with the midrib, oblique and slightly curved upwards to end close to the margin in a series of diminishing loops which join them; transverse nervules irregular and with the much netted reticulation prominent and more or less raised on both surfaces; petiole stout, 2—2.5 cm. long, the upper part bordered by the decurrent margins of the blade. *Inflorescence* paniculate, much branched, reaching 20 cm. in length, glabrous, the peduncle and its branches with oblong lenticels. *Fruit* ellipsoid, slightly pustular, 3.5 cm. long, 2—2.5 cm. broad; pedicels slightly

enlarged, rusty-brown, rugose; scar of the fallen perianth-tube pale scarcely enlarged.

PENANG: at Birch's Hill, *Fox* 10705! (Herb. Singap.)

### 3. DEHAASIA, Blume.

Evergreen trees, the branchlets generally pale, the buds lanceolate. *Leaves* alternate, more or less coriaceous, penni-nerved, often fascicled at the ends of the branchlets. *Flowers* small, hermaphrodite, in axillary peduncled panicles of few-flowered dichasia. *Perianth*-tube very short; lobes 6, the 3 outer much the shortest. Perfect *stamens* 9, small, clavate, the anthers 2-celled; those of the 1st row opposite the outer shorter perianth-lobes, introrse; those of the 2nd row opposite the inner perianth-lobes, introrse; those of the 3rd row opposite those of the 1st row, extrorse, each furnished at the base and a little behind it with 2 rather large subsessile glands; staminodes of the 4th row opposite the 2nd row stamens small or wanting, when present usually cordate stipitate. *Ovary* sessile, rounded, attenuate into a short style. *Fruit* an oblong berry, seated on the persistent broadened perianth which is supported by the very much thickened, usually red, often warted, clavate pedicel; cotyledons thick, fleshy; radicle minute.—*DISTRIB.* About 10 species; Indian and Malayan.

Staminodes of 4th row wanting; leaves chartaceo-coriaceous, over 15 cm. long and 7 cm. broad; flowers about 5 mm. in diam. . . . .

1. *D. microcarpa*.

Staminodes of 4th row present; flowers scarcely 3 mm. in diam.

Leaves chartaceous, lanceolate, not minutely reticulate, not fascicled at the tops of the branchlets ..

2. *D. nigrescens*.

Leaves coriaceous, more or less obovate, reticulate, fascicled at the top of the branchlets.

Staminodes of 4th row rather large; main nerves of leaves prominently impressed above; panicles pubescent ..

3. *D. cuneata*.

Staminodes of 4th row quite small, main nerves not prominently impressed; panicles glabrous

4. *D. Curtisii*.

Leaves very coriaceous, lanceolate, more or less fascicled; staminodes very small; main nerves and nervules of leaves prominently raised on both surfaces ..

5. *D. lancifolia*.

1. *DEHAASIA MICROCARPA*, Blume in Rumph. i. 162, t. 44 (1835).

A tree with spreading branches reaching 15 to 25 m. in height and

the stem 40 to 60 cm. in diameter; branchlets rather thick, glabrous, with white shining bark, lenticellate; leaf-buds conical, glabrous, up to 1 cm. long with few black scales. *Leaves* chartaceo-coriaceous, alternate; elliptic-oblong or -obovate or -oblanceolate, acute or acuminate at apex, cuneate or attenuate or sometimes unequally rounded at base; both surfaces glabrous, pale olive-green and shining when dry; 15—40 cm. long, 7—17 cm. broad; midrib stout, broad, prominent beneath; main nerves irregularly spaced, 9—15 pairs, usually 12, the lowest 1 or 2 pairs near the base, the rest more distantly spaced, all curving upwards to and along the margin where they meet in short loops, slightly impressed and keeled on the upper surface, prominent and white on the lower, joined by irregular transverse nervules and indistinct reticulations; petiole rather stout, channelled above, 1—3 cm. long. *Flowers* in erect, glabrous or slightly puberulous, reddish panicles from the upper axils and especially from below the terminal leaf-buds, 10 to 20 cm. long, 5—6 cm. broad; peduncles usually short, angular; branches at right angles to the rhachis, 1—2 cm. long, flattened, dichotomously branched; bracts small, ovate; bracteoles triangular; pedicels clavate, 2—5 mm. long; flower-buds ovoid; flowers yellowish-white. *Perianth*-tube very short, continuous with the pedicel; lobes 6, the outer 3 triangular, 1—1.5 mm. long, the inner 3 ovate, rounded, 2—3 mm. long, all glabrous or very minutely puberulous without. *Stamens* of the first and second rows 2.5 mm. long, filaments broad, white-villous, anthers short, the cells small, connective depressed at tip; stamens of 3rd row similar but rather longer, furnished a little behind their bases with glabrous sessile glands; staminodes of 4th row wanting. *Ovary* and slender style 2.5 mm. long; stigma obtuse. *Berry* black, oblong-ellipsoid, 4 cm. long; 2 cm. broad, seated on the much enlarged trigonous obconic scarlet-warted 2—3 cm. long pedicel which is surmounted by the persistent perianth-lobes; pericarp shining, thin; embryo depressed at apex. Hook. f. *Fl. Br. Ind.* V. 126; Koord. & Val. *Bijdr.* X. 201. *D. squarrosa*, Zoll. et Mor. in *Zoll. Cat.* 113, 115; Hassk. *Retz.* i. 8; Miq. *Fl. Ind. Bat.* 929. *Haasia microcarpa*, Nees *Syst. Laur.* 373; Meissn. in *DC. Prodr.* XV. i. 60; Miq. l.c. 928. *H. incrassata*, Nees *Syst. Laur.* 376; Miq. l.c. 930. *Laurus incrassatus*, Jack in *Mal. Misc.* ii. No. 7. 33 (ex Wall. *Cat.* 2589). *Persea incrassata*, Nees *Syst. Laur.* 127. *Machilus incrassatus*, Nees in Wall. *Pl. As. Rar.* ii. 70,

PERAK: *Scortechini* 1842!; at Gunong Kerbang, *Ridley* 14738!; at Trong, *Wray* 3188!; in dense forest, chiefly on limestone, up to

250 m. alt., *King's Collector* 4950!, 7360!, 7731!, 8204!, 8655!. MALACCA: *Griffith* K.D. 4252!; *Maingay* K.D. 1274!; at Panchor, *Goodenough* 1264! SINGAPORE: at Turong, *Ridley* 10760!.—DISTRIB. Java, Sumatra, Borneo (*Haviland* and *Hose* 3090!, 3091!, 3332!, 3655!).

2. *DEHAASIA NIGRESCENS*, Gamble in Kew Bull. 150 (1910). A tree, reaching 10—12 m. in height; branchlets slender, greyish-white, uppermost black when dry; leaf-buds black, lanceolate, without scales. Leaves chartaceous; lanceolate or oblanceolate, bluntly long-acuminate at apex, attenuate at base; both surfaces dark brown to black when dry, dull on the upper, glabrous; 8—13 cm. long, 3—4 cm. broad; midrib slender; main nerves 8—10 pairs at 40°—50° with the midrib, slender, curving upwards to meet in loops near the margin; reticulations irregular, inconspicuous; petiole slender, 1—2 cm. long. Flowers very small, in panicles from the uppermost leaf-axils, slender, glabrous, up to 10 cm. long; peduncle long; branches few, at right angles to rhachis, dichotomous; pedicels clavate; buds globose. Perianth-tube cup-shaped, continuous with the pedicel; lobes small, the 3 outer triangular .75 mm. long, the 3 inner twice as long and ovate, all minutely golden-pubescent without, golden-villous within. Stamens of 1st and 2nd row clavate, .75 mm. long; connective obtuse; filaments villous; those of 3rd row similar and a little longer having 2 large cordate glabrous glands behind at the base; staminodes of 4th row .5 mm. long, cordate, rather smaller than the glands. Ovary globose; style short; stigma obtuse. Fruit a black obovate-ellipsoid drupe 2 cm. long by 1 cm. in diam., seated on the enlarged obconical, straight or curved, bright red (when dry—black), pedicel which is surmounted by the persistent perianth-lobes.

PENANG: on Government Hill, at 300 to 600 m. alt., *Curtis* 1183! SINGAPORE: Garden jungle, *Ridley* 13017!

I have taken a long time over the stamens of this species. The material afforded very few flowers and though most of the anthers were distinctly only 2-celled, I found a few which seemed to me to be as clearly 4-celled. The anthers are exceedingly minute and are villous so that it is difficult to examine them, and though I believe I am right in placing it in *Dehaasia*, it is quite possible that fresh specimens examined in the field may make its transfer to *Nothaphæbe* necessary. It is noticeable that *Curtis'* material though all bearing the No. 1183 was certainly collected on different occasions and from different trees, some at 300 m., some at 600 m.

3. *DEHAASIA CUNEATA*, Blume Rumph. I. 164, t. 46 (1835).

A tree, reaching 12 to 15 m. in height and 25 to 40 cm. in diameter; branchlets moderately slender, with white bark, lenticellate; leaf-buds small, conical, tawny-velvety, without scales. *Leaves* coriaceous, variable, fascicled at the ends of the branchlets and the one or two upper joints as if verticillate; obovate, acute obtuse or rarely acuminate at apex, cuneate at base; upper surface black when dry, glabrous except on the midrib and main nerves; lower surface puberulous, glaucous or glaucescent; 7—15 cm. long, 3—7 cm. broad; midrib stout, impressed above, much raised beneath; main nerves 8 to 10 pairs, occasionally more, prominently impressed above and raised beneath, at first at about 45° with the midrib, curved upwards to near the margin where they are joined in gradually lessening loops; transverse nervules few, rather irregular; reticulations minutely areolate, raised on both surfaces; petiole stout, 5—15 mm. long or almost 0, usually bordered by the decurrent margins of the blade. *Flowers* very small, yellowish, in slender blackish puberulous panicles from the upper leaf-axils, up to 10 cm. long and 4 cm. broad; peduncle 4—5 cm. long; branches slender, dichotomous; cymes few-flowered; pedicels clavate, 2—3 mm. long; buds globose. *Perianth*-tube short; lobes ovate, obtuse, the outer three the shortest, puberulous on both sides. *Stamens* minute; those of 1st and 2nd rows clavate, rounded at apex, densely villous, .75 mm. long; those of 3rd row a little longer and with 2 large glabrous glands; staminodes of 4th row rather large, ovate-cordate, glabrous except a tuft of hairs at base, stipitate, .75 mm. long. *Ovary* rounded-conoidal; style almost none; stigma peltate. *Fruit* an ovoid oblong berry, 2—4 cm. long, seated on the enlarged perianth tube and a 2—4 cm. long thick enlarged warted pedicel, which is sometimes curved; pericarp bluish-black, smooth. Hook. f. Fl. Br. Ind. V. 125; Koord. & Val. Bijdr. X. 203. *Haasia cuneata*, Nees Syst. Laur. 378. *Cryptocarya cuneata*, Bl. Bijdr. 558. *Cyanodaphne cuneata*, Bl. Mus. Bot. Lugd. Bat. I. 333; Meissn. in DC. Prodr. XV. i. 76; Miq. Fl. Ind. Bat. I. 926. *C. tomentosa*, Bl. in Mus. Bot. Lugd.-Bat. I. 334; Miq. Fl. Ind. Bat. Suppl. 145. *Alseodaphne grandis*, Kurz For. Fl. II. 293 (not of Nees). *Dictyodaphne?* *Candolleana*, Meissn. in DC. l.c. 80. *Endiandra?* *Candolleana*, Kurz l.c. 295.

PERAK: at Thaiping, Wray 2099!, 2654!, 3101!; in dense low-level forest near Larut, King's Collector, 6745!; at Lumut Dinding, Ridley 3038!—DISTRIB. Burma, Java, Sumatra.

4. *DEHAASIA CURTISII*, Gamble in Kew Bull. 151 (1910). A

small tree; branchlets rather stout, stiff, rough especially just below the leaves, greyish-white; leaf-buds lanceolate acuminate with glabrous scales. *Leaves* coriaceous, in close fascicles at the ends of the branchlets; obovate, very obtusely acute at apex, long-cuneate at base; both surfaces glabrous and minutely reticulate, the upper dark grey, shining, the lower glaucous; margins recurved; 6—12 cm. long, 3—5 cm. broad; midrib prominent, raised on both surfaces; main nerves 10—12 pairs, raised on both surfaces, at about 70° with the midrib and curved to branch near the margin and so join in loops, joined by the prominently areolate raised reticulation; petiole 1—2 cm. long, black, channelled. *Flowers* very small, in slender dichotomous corymbose pedunculate glabrous panicles from the axils of upper leaves or the scars of fallen ones, about 6 cm. long; peduncles 4—5 cm. long, slightly flattened, branches slender; terminal cymules 3-flowered; pedicels clavate, 2—3 cm. long continuous with the perianth-tube. *Perianth*-tube cup-shaped; lobes ovate, obtuse, the outer three 1—1.5 mm. long, the inner three 1.5—2 mm. long, all slightly pubescent. *Stamens* very small, those of the 1st and 2nd rows .75 mm. long, clavate, villous, the connective emarginate; those of 3rd row similar but more square and a little longer, with 2 rather large glabrous glands at the base just behind; staminodes of 4th row very small, cordate, stipitate, villous behind. *Ovary* ovoid; style slender; stigma obtuse. *Fruit* ellipsoid, black when dry, smooth, 1 cm. long and .75 cm. in diameter seated on the clavate thickened pedicel 5 mm. long.

PENANG: at the Rifle Range, Government Hill, at 750 m. alt., *Curtis* 1193!. SELANGOR: top of Batu caves, *Kelsall* 1986!; *Ridley*!

*Ridley's* specimen has very small leaves under 5 cm. long and 2 cm. broad, and the small fruit here described, but there seems no reason to consider it other than a low-growing specimen of *D. Curtisii*.

5. *DEHAASIA LANCIFOLIA*, *Ridley* in Journ. Linn. Soc. XXXIII. 320 (1908). A small tree or large shrub reaching 7—8 m. in height and 28 cm. in diam. of stem; branchlets stout, glabrous, dark reddish brown, uppermost angled by lines decurrent from the leaves; buds very small. *Leaves* very coriaceous, glabrous, somewhat fascicled at the nodes; lanceolate or oblong-lanceolate, obtusely acuminate at apex, cuneate at base; both surfaces glabrous, reddish when dry; 15—20 cm. long, 3.5 to 7 cm. broad; midrib stout, very prominent beneath; main nerves 9—14 pairs, raised on both surfaces, at first straight afterwards curving to meet in loops near the margin; trans-



verse nervules few, irregular, raised on both surfaces enclosing obscure reticulations; petiole stout, 1—1.5 cm. long, bordered in the upper half by the decurrent margins of the blade. *Flowers* in elongate spreading panicles up to 10 cm. long, with few short pubescent branches ending in greenish cymules, the flowers 6—7 together in the cymules with short pubescent pedicels. *Perianth*-tube obconic, very short; lobes nearly glabrous, ovate, the outer 3 much shorter (.75 mm.) than the inner (1.75 mm.). *Stamens* nearly glabrous, those of the 1st and 2nd rows clavate with rounded apices 1 mm. long; those of the 3rd row similar but with a pair of rather large glabrous glands at the back of the filaments; staminodes of the 4th row ovate, .75 m. long, sometimes absent. *Ovary* ovoid, glabrous; style thick, curved; stigma large, thick, capitate. *Drupe* elliptic, 3—4 cm. long, the pedicel only slightly thickened.

PAHANG: on Gunong Tahan at 1500—2000 m. alt., *H. C. Robinson* and *L. Wray* 5468!, 5526.

### Tribe III. ACRODICLIDIEÆ.

#### 4. ENDIANDRA, R. Br.

Evergreen trees. *Leaves* alternate, penni-nerved, conspicuously reticulate-areolate, coriaceous; buds small, with leafy scales. *Flowers* small, hermaphrodite, in axillary or subterminal panicles. *Perianth*-tube very short; lobes 6, subequal or the inner rather smaller. *Stamens* of the 1st and 2nd row absent; those of the 3rd row 3, 2-celled, extrorse, thick, sessile, usually connivent over the ovary; staminodes of the 4th row none or minute or replaced by a fleshy ring; glands absent or 6 at the base of the perfect stamens. *Ovary* sessile, usually globose, surrounded by the perianth-tube; style short; stigma capitate. *Fruit* an oblong or subglobose berry, the pedicel sometimes thickened; perianth usually wholly deciduous. **DISTRIB.** About 15 species, Indian, Malayan and Australian.

The Malay Peninsula species all seem to belong to subgenus *Dictyodaphne*, Miq. characterized by the absence of staminodes and glands.

- |  |                         |
|--|-------------------------|
| Leaves under 10 cm. long and 4 cm. broad, glabrous, main nerves 8 to 10 pairs; panicles glabrous .. ..                     | 1. <i>E. Maingayi</i> . |
| Leaves 10 to 13 cm. long and 6 cm. broad, pubescent beneath, main nerves 5—6 pairs; panicles densely tawny-pubescent .. .. | 2. <i>E. Kingiana</i> . |
| Leaves over 15 cm. long and usually 10 cm. broad, glabrous, main nerves 8-10 pairs; panicles nearly glabrous .. ..         | 3. <i>E. præclara</i> . |

*Species imperfectly known.*

Leaves glabrous, more or less lanceolate, main nerves 5—7

pairs .. .. . 4. *E. Wrayi*.

1. *ENDIANDRA MAINGAYI*, Hook. f. in Fl. Br. Ind. V. 127 (1886). A large evergreen tree with spreading branches, reaching 20 to 25 m. in height and 40—50 cm. in diameter; branchlets rather slender, greyish-brown; leaf-buds small, with lanceolate glabrous stipules. *Leaves* coriaceous; elliptic or elliptic oblong, obtusely acute or subcaudately acuminate at apex, cuneate at base; both surfaces minutely areolate, glabrous, shining, reddish-brown when dry; 5—10 cm. long, 2—4 cm. broad; midrib slender, raised on both surfaces; main nerves 8 to 10 pairs, also slightly raised on both surfaces, otherwise inconspicuous, at first straight then curved near the margin to join in faint loops; reticulations prominently areolate; petiole 7—12 mm. long, slender, black, rugose. *Flowers* in short (about 3—4 cm.) axillary subracemose glabrous panicles of few-flowered (about 5) cymules, the rhachises angular, puberulous; pedicels slender, 1 mm. long; buds globose. *Perianth*-tube very short; lobes 2 to 2.5 mm. long, glabrous except a thickened granular-glandular cushion at the base, inner 3 lobes smaller and less imbricated than the 3 outer. *Stamens* thick, conoidal, connivent over the ovary which they enclose, prominently granular-glandular, 1.5 mm. long; anthers sessile, their cells distant, their lids up-curved curled backwards. *Ovary* globose; style short; stigma capitate. *Fruit* oblong or oblong-obovate, glossy black, smooth, 3—5 cm. long, about 2 cm. broad; fruiting pedicel slightly thickened; pericarp rather thin; cotyledons very fleshy.

PERAK: forests near Larút at 150—250 m., *King's Collector* 6103!, 8822!. MALACCA: *Maingay*, K.D. 1270!

2. *ENDIANDRA KINGIANA*, Gamble in Kew Bull. 151 (1910). An evergreen tree with spreading branches, reaching 15 to 20 m. in height and a considerable diameter; branchlets stout, brown, the bark flaking off, much lenticellate, uppermost glandular-rusty-pubescent; buds short, ovoid, densely pubescent. *Leaves* coriaceous; elliptic, obtusely short-acuminate at apex, acute or cuneate at base; both surfaces shining, minutely areolate, upper glabrous except on the midrib and main nerves, lower softly pubescent, reddish-brown when dry; 10—13 cm. long, 6—7 cm. broad; midrib stout, thickly pubescent, raised on both surfaces; main nerves 5—6 pairs, pubescent and

impressed above, raised beneath, prominent, curved upwards to and along the margin where the upper ones join in loops; secondary nerves few, branching and irregular; reticulations prominently areolate; petiole stout, tawny-pubescent, rugose, 1.5–2 cm. long. *Flowers* in rather dense short (about 3–4 cm.) axillary and terminal thickly tawny-pubescent panicles of few-flowered cymules; pedicels extremely short or none; bracts very small, caducous; buds ovoid; flowers waxy yellowish-brown. *Perianth*-tube very short, tawny-pubescent; lobes imbricate, up to 3 mm. long, ovate-oblong, the outer longer than the inner ones, granular-glandular within especially at the base. *Stamens* thick, conoidal, 1.5–2 mm. long, connivent over the ovary which they enclose, prominently granular-glandular; anthers sessile, cells elongate, the lids up-curved and curled outwards. *Ovary* globose, glabrous, 5 mm. in diam.; style very short; stigma capitate. *Fruit* not known.

PERAK: in dense jungle at 150 to 250 m., *King's Collector* 6487!.

Description largely after Sir G. King's notes.

3. *ENDIANDRA PRÆCLARA*, Gamble in Kew Bull. 152 (1910). An evergreen tree reaching 15 to 20 m. in height and 45 to 60 cm. in diameter of stem, with spreading branches; branchlets stout, smooth, glabrous, striate, dark brown; leaf-buds small. *Leaves* chartaceo-coriaceous; elliptic-obovate or -oblong, shortly obtusely acute or acuminate at apex, cuneate or sometimes rounded at base; both surfaces glabrous, shining, conspicuously and minutely reticulate; 15–40 cm. long, 5–17 cm. broad; midrib stout, slightly depressed above, much raised beneath; main nerves 8–10 pairs, rather irregular, the lowest 1–2 pairs from close to the base and more oblique than the rest, all at first straight then curving gently to and along the margin when they join in a series of short loops; secondary nerves few; transverse nervules not more prominent than the minutely areolate reticulations which are raised on both surfaces; petiole stout, rugose, 10–15 cm. long. *Flowers* rather large, in branching nearly glabrous axillary and subterminal panicles reaching 20 cm. in length and about 10 cm. in breadth; peduncles 0 or very short; rhachis glabrous, flattened; cymules puberulous, few-flowered (about 10); pedicels slender, 1–2 mm. long; flowers light yellow, the buds ovoid, 2–3 mm. in diameter. *Perianth*-tube cup-shaped, puberulous; lobes ovate, the outer three 2.5 mm. long somewhat larger than the inner 3, all glabrous without, granular-glandular at the base within. *Stamens* thick, conoidal, connivent over the ovary which they en-

close, 2 mm. long; connective prominently granular-glandular; anthers sessile, the cells distant, oblong, their lids up-curved and curled backwards. *Ovary* globose; style short, stigma capitate. *Fruit* oblong-ellipsoid, dark red, smooth, 8—10 cm. long, 4 cm. broad; pericarp rather thin; cotyledons very large, fleshy.

PERAK: at Tupai, Wray 3097!; near Larut up to 300 m. alt., King's Collector 4074!, 6714!.

*Species imperfectly known.*

4. *ENDIANDRA WRAYI*, Gamble in Kew Bull. 152 (1910). A small tree; branchlets slender, brown, lenticellate, uppermost angular, rugose; buds conical, acute. *Leaves* coriaceous; elliptic-oblong or oblanceolate, very obtusely acuminate at apex, acuminate-cuneate at base; both surfaces minutely areolate, glabrous, shining; 7—14 cm. long, 2—5 cm. broad; midrib slender, raised on both surfaces; main nerves 5—7 pair, slightly impressed above, very oblique, at first straight then curving to join in loops near the margin; reticulations prominently areolate; petiole slender, 5 to 10 mm. long. *Flowers* in short axillary racemes or panicles, not otherwise known. *Fruit* oblong, black, smooth, 2.5 cm. long by 1 cm. broad, on a rather stout thickened peduncle.

PERAK: at 300 m. in Upper Perak, Wray 3785!.

Wray 2237 from Relan Tujur "a tree with dark green leaves and rusty-brown fruit" agrees as regards leaves fairly well with specimens of *Endiandra rubescens*, Miq. Fl. Ind. Bat. I, 1, 918 in the Kew and Calcutta Herbaria, but the fruit is rather different. It is oblong-ellipsoid, obtuse at apex, rather acute at base, 5—6 cm. long, 2—2.5 cm. broad, the pericarp rusty-brown, furfuraceously netted. Koorders and Valeton describe the fruit of *E. rubescens* as 'subterete or obovate-oblong, obtuse at apex, slightly incurved, oblique and truncate at base, sometimes striolate, 5—7 cm. long, 2—2.5 cm. broad.' A specimen in the Kew Herbarium has the pericarp black and smooth. Without flowers, I hesitate to describe the plant.

Tribe IV. MICROPORÆ.

5. *MICROPORA*, Hook f.

A tree with slender branchlets. *Leaves* alternate, penni-nerved, conspicuously reticulate; buds conical with leafy scales. *Flowers* small, hermaphrodite, in axillary few-flowered panicles or racemes. *Perianth*-tube very short, flattened; lobes 6, orbicular, equal. *Stamens* of the 1st and 2nd row 6, exsert, anthers sessile, thick, subquadrate, cells extrorse, distant, opening by two nearly circular pores,

lids upcurved; stamens of the 3rd and 4th rows reduced to short thick staminodes as large as the fertile anthers and produced above them. *Ovary* ovoid, sessile, quite smooth, narrowed into a very short style; stigma minute. *Fruit* ovoid, seated on the persistent and accrescent perianth and stamens.—DISTRIB. One species.

1. *MICROPORA CURTISII*, Hook f. Ic. Plant. t. 1547 (1886). An evergreen tree, reaching 12 to 18 m. in height and 40 to 50 cm. in diameter of stem; branchlets slender, corky, greyish-brown, lenticellate, puberulous; buds long-conical; scales lanceolate, tawny-villous. *Leaves* thinly coriaceous, membranous when young and then black when dry; elliptic, acute at apex, attenuate at base; both surfaces reticulate-areolate, reddish-brown, glabrous except on the midrib beneath; 6—13 cm. long, 3—6 cm. broad; midrib prominent, nearly flat above, raised beneath; main nerves 8 to 10 pairs, curved gently to the margin and there joined by loops, raised on the lower surface, joined by an elegant network of reticulations; petiole 10—20 mm. long. *Flowers* in short few-flowered tawny-puberulous racemes or panicles 2—3 cm. long; bracts lanceolate, 1—2 mm. long; pedicels as long; buds globose, as are the flowers which are 2—2.5 mm. in diam., light yellow when fresh. *Perianth*-tube flat; lobes orbicular, about 1 mm. long, ciliate; stamens and staminodes puberulous and ciliate. *Ovary* glabrous. *Fruit* ovoid, rugose, 3—4 mm. long (immature); accrescent perianth and stamens nearly 2 mm. thick. Hook f. Fl. Br. Ind. V. 862. *Hexapora Curtisii*, Hook. f., l.c. 189.

PENANG: at Government Hill, 300 m., *Curtis* 525!, 1214!; *Ridley* (?) 3153!. PERAK: open jungle near Larut, at 250—300 m. *King's Collector* 5215!. PAHANG: Kwala Triang, Lubu Lanjoot, on the Pahang river (*Ridley* in Trans. Linn. Soc. 2nd Ser. iii, 341).

I have quoted *Ridley's* Pahang citation; but the specimens in the Singapore Herbarium from Kwala Triang (No. 2273) and Lubu Lanjoot are not those of *Micropora*, but of a species of *Beilschmiedia*.

#### Tribe V. CINNAMOMEÆ.

#### 6. CINNAMOMUM, Blume.

Evergreen trees or shrubs, usually with aromatic bark. *Leaves* opposite, sub-opposite or alternate, 3-ribbed or (Sect. CAMPHORA) penninerved. *Flowers* small, hermaphrodite or by abortion polygamous, in axillary or subterminal panicles or sometimes lateral at the base of the youngest shoots, the branches usually ending in dichasia, the

middle flowers of which are the largest and most fertile. *Perianth*-tube short, funnel-shaped, enlarged in fruit; lobes 6, subequal, persistent or partly truncate or deciduous in fruit. *Stamens* 9 perfect or by abortion fewer, anthers 4- or occasionally 2-celled; those of the 1st row opposite the outer perianth-lobes, introrse, eglandular; those of the 2nd row similar, opposite the inner perianth lobes; those of the 3rd row opposite those of the 1st row, extrorse or with lateral anther-cells, the filaments bearing two glands which are sessile or stipitate and usually near the middle, but sometimes at the base and nearly free; staminodes of the 4th row opposite the 2nd row stamens cuneiform cordate or sagittate, stipitate. *Ovary* sessile at the bottom of the perianth-tube and free from it, narrowed into the style; stigma discoid or obscurely 3-lobed. *Fruit* a berry seated on the usually cup-shaped enlarged perianth-tube, the lobes persistent, deciduous or sometimes truncate near their middle. *Seed* conform to the fruit; testa membranous; cotyledons fleshy.—**DISTRIB.** About 140 species, of tropical and subtropical Eastern Asia, Australia and the Pacific.

Leaves opposite or sub-opposite, with 3 or more ribs; inflorescence buds naked or with small scales; stamens rather large with ovoid or oblong anthers and elliptic cells. perianth-lobes persistent or tube truncate after flowering (Sect. I. *MALABATHRUM*).

Midrib without main nerves, but with transverse nervules between it and the side ribs.

Leaves glabrous, at any rate when mature.

Flower-panicles very short, slender, glabrous; leaves caudate at apex ..

1. *C. graciliflorum*.

Flower-panicles elongate, puberulous.

Leaves ovate, acute at apex, side ribs scarcely reaching  $\frac{3}{4}$ ths of the length of the blade; fruiting perianth large, ribbed, with persistent lobes ..

2. *C. zeylanicum*.

Leaves oblong, side ribs reaching to near the apex.

Side ribs reaching the apex and there joining the midrib, leaves often very large; fruiting perianth small, with persistent lobes ..

3. *C. iners*.

Side ribs reaching the base of the acumen only.

Acumen attenuately long, very obtuse at tip; inflorescence sparsely puberulous; stamens stout, nearly glabrous

4. *C. Ridleyi*.

Acumen prominent, abrupt,

- obtuse at tip; leaves more than 4 cm. broad, transverse nervules distinct; inflorescence grey-pubescent .. .. 5. *C. rhyncophyllum*.
- Acumen merely acuminate, almost acute at tip; leaves under 4 cm. broad, transverse nervules indistinct; inflorescence very tawny-pubescent .. .. 6. *C. lampongum*.
- Leaves lanceolate, acuminate with obtuse apex, side ribs ending 2-3 cm. below apex; fruiting perianth smooth, glabrous, the lobes deciduous .. .. 7. *C. vimineum*.
- Leaves elliptic, obtuse at apex, side ribs reaching only  $\frac{1}{3}$ ths the length of blade .. .. 8. *C. Deschampsii*.
- Leaves hairy, at any rate on the under surface
- Leaves large, usually over 12 cm. long.
- Leaves with prominent ladder-like transverse nervules and abrupt acumen; flowers in terminal stout panicles .. .. 9. *C. javanicum*.
- Leaves without prominent ladder-like transverse nervules, the acumen attenuate; flowers in axillary slender panicles .. .. 10. *C. mollissimum*.
- Leaves small, usually much under 12 cm. long.
- Leaves with greyish-tawny pubescence, shortly and obtusely acuminate at apex, rounded at base, the side nerves to outer ribs prominent .. .. 11. *C. Scortechinii*.
- Leaves with golden-tawny pubescence, attenuately long-acuminate at apex, acuminate at base, without side nerves to outer ribs .. .. 12. *C. aureo-fulvum*.
- Midrib with several pairs of main nerves; leaves lanceolate, cinereous .. .. 13. *C. cinereum*.
- Leaves alternate or rarely subopposite, penninerved, 1-ribbed; inflorescence buds perulate; stamens very small, with rounded obtuse anthers and usually circular anther-cells; perianth-lobes quite deciduous after flowering (Sect. II. CAMPHORA).
- Leaves concolorous, pitted in the axils of the



- nerves; filaments as long as or longer than anthers, lower cells elliptic .. .. 14. *C. inunctum*.  
 Leaves glaucous beneath, not pitted in the axils of the nerves; filaments scarcely as long as anthers, lower cells circular .. .. 15. *C. Parthenoxylon*.

1. CINNAMOMUM GRACILIFLORUM, Gamble in Kew Bull. 218 (1910). An evergreen tree (?); branchlets slender, terete, brown, the younger slightly puberulous; leaf-buds lanceolate, grey-pubescent. *Leaves* chartaceous, opposite or subopposite; elliptic, elliptic-ovate or lanceolate, the apex with a long (1—2.5 cm.) caudate acumen obtuse at tip, base acute or slightly rounded; both surfaces glabrous, grey when dry, the upper shining, the lower dull and glaucescent; 7—13 cm. long, 3—6 cm. broad; ribs 3, slightly raised on the upper, more so on the lower surface, usually with a small extra pair starting along or close to the margin and finally forming a slender looped intramarginal ring, the midrib produced to the tip of the acumen, the next pair curved to the base of the acumen and continued in small loops; side nerves outside the pair many joining the sinuses of the intramarginal loops; transverse nervules irregular, arched; reticulation areolate; petiole slender, black, 5—10 mm. long. *Flowers* in very slender few-flowered axillary or lateral racemes up to 4 cm. long; peduncles capillary, glabrous; pedicel scapillary, clavate at tip; flowers 3—5, glabrous without. *Perianth*-tube campanulate, 1 mm. long, glabrous within; lobes ovate-oblong, grey-pubescent within, 2 mm. long. *Stamens* very slender, glabrous except a few scattered bristles and a small tuft at base, 2 mm. long; anthers 4-celled with the upper pair of cells minute, or 2-celled only; those of 1st and 2nd rows with small ovate anthers; those of 3rd row similar and with a pair of reniform or oblong glabrous sessile glands towards the top of the filament; staminodes of 4th row cordate acute. *Ovary* ovoid with a tooth near the top, glabrous; style slender; stigma small, capitate. *Fruit* an ovoid drupe 10 mm. long and about 8 mm. in diameter seated on a glabrous cupule formed of the enlarged perianth-tube bordered by the semi-deciduous lobes, the cupule about 6 mm. in diameter; pedicel also obconically thickened; pericarp yellowish, shining, crustaceous.

PERAK: at Gunong Ijuk, *Scortechini* 1228!; in upper Perak *Wray* 3664!.

This species resembles in leaf a small-sized var. of *C. rhyncophyllum*; but the flowers are completely different. It seems to come near to *C. Burmanni*, Bl. but the leaves of that species are thicker and have not the long caudate

acumen. The nearest relation, however, is *C. pauciflorum*, Nees, from which it differs in the thinner more oblong leaves and the side ribs reaching to the very base of the acumen.

2. CINNAMOMUM ZEYLANICUM, Blume Bijdr. 568 (1825). A moderate-sized evergreen tree with rather thick aromatic bark, smooth when young; branchlets terete, dark brown, the uppermost subquad-rangular; leaf-buds ovoid, finely silky. *Leaves* coriaceous, opposite or subopposite; ovate or ovate-lanceolate, acute or obtusely acuminate at apex, acute or rounded at base; both surfaces glabrous; 8—16 cm. long, 4—8 cm. broad; midrib stout, slightly raised above, more so beneath; side ribs 1 or sometimes 2 pairs, when 2 pairs the outer pair slender short close to the margin, the main pair strong at first along-side the midrib for 5—10 mm. then curved to about three-fourths of the length of the leaf when they disappear in faint loops; transverse nervules irregular, rather distant, arched, hardly visible; reticulation under the lens minutely areolate; petiole broad, dark, 1—2 cm. long. *Flowers* numerous, in silky-pubescent lax axillary panicles up to 17 cm. long; peduncles slender, quadrangular, usually glabrous; branches spreading, trichotomous, ending in 3-flowered dichasia; pedicels slender, grey-puberulous; bracts ovate acute, caducous; buds subglobose, grey-puberulous. *Perianth*-tube short, continuing the pedicel, 1—2 mm. long, glabrous within; lobes oblong or ovoid-oblong, the outer rather longer and sometimes spathulate 3—5 mm. long, densely silky within. *Stamens* slender, those of 1st and 2nd rows spathulate, 2—3 mm. long, the filaments slightly pubescent, the anther-cells large slightly overlapping, those of 3rd row with small anthers and a pair of large reniform or oblong glabrous sessile glands about half-way up the slightly puberulous filaments; staminodes of 4th row slender, heads small, cordate-sagittate, filaments nearly glabrous, 1—2 mm. long. *Ovary* ovoid, glabrous; style slender; stigma large, peltate. *Fruit* an oblong or ovoid-oblong berry 15—17 mm. long, 7—8 mm. in diameter seated on and partly immersed in the cupular enlarged perianth and its persistent lobes, the cupule 7—8 mm. in diam., often strongly ribbed; pericarp smooth, brown and shining when dry, purple when fresh. Nees Syst. Laur. 45 and in Wall. Pl. As. Rar. II. 74 and III. 32; Meissn. in DC. Prodr. XV. i. 13; Miq. Fl. Ind. Bat. I. i, 898; Wight Ic. tt. 123, 129, 134; Wall. Cat. 2573; Kurz For. Fl. II. 287; Hook. f. Fl. Br. Ind. V. 131; Trimen Fl. Ceyl. III. 440; Cooke Bomb. Fl. II. 535; Prain Beng. Plants 898; Brandis Ind. Trees 533; Baillon Hist. des Pl. II. 429. t. 240; Engl. & Prantl Naturl. Pflanzenfam. III. ii.

113, t. 73. *Laurus Cinnamomum*, Linn. Sp. Pl. 369; Roxb. Fl. Ind. II. 295.

MALACCA: *Griffith* K.D. 4246—1!; Chin Singh's Plantation (cult), *Muingay* K.D. 4241!. SINGAPORE: *Ridley* 8099 (cult.)!, garden jungle 12595!; *Hullett* 7!; *Caniley* 148!, 207!. The Cinnamon tree.—DISTRIB. South India and Ceylon, elsewhere cultivated only.

This species does not seem to be indigenous in the Malay Peninsula, but it has been cultivated and seems to have run wild. I have quite failed to identify the available specimens with the published varieties.

3. CINNAMOMUM INERS, Reinw. in Blume Bijdr. 570 (1825). A tree, reaching 15 to 20 m. in height and up to 40 cm. in diam. of stem; branchlets terete, dark grey-brown, prominently lenticellate, uppermost appressed-puberulous; leaf-buds conical, grey-silky, 5 mm. long, with small scales; innovations grey-pubescent. *Leaves* chartaceous to coriaceous, opposite or alternate, very variable in size and often sphacellate at apex; elliptic or elliptic-oblong or -lanceolate, sometimes linear-lanceolate or linear-oblong, obtuse or acute at apex, rounded or acute at base, 3-ribbed; both surfaces glabrous when old, slightly puberulous beneath when young, when very young usually ashy-grey-pubescent; upper surface shining, lower dull and pale or almost glaucous; margins usually reflexed, cartilaginous; 6--25 cm. long (sometimes to 40 cm. in young trees and coppice shoots), 2 to 12 cm. broad; midrib stout, raised, straight to the apex, side ribs from the base or leaving the midrib a little above it, uniformly curved to meet it and each other again at the apex; transverse nervules between the mid and side ribs subparallel, horizontal or slightly arched; nerves between the side ribs and margin looped; reticulation under the lens minutely areolate, in old large leaves scarcely seen; petiole 1--2 cm. long, stout, sometimes twisted. *Flowers* yellowish in grey-silky pedunculate subterminal or axillary spreading panicles of variable length from 5 to 25 cm.; branches lax, dichotomous, ending in 3- or 7-flowered dichasia; bracts and bracteoles very small, caducous; pedicels 3--6 mm. long; buds globose. *Perianth*-tube funnel-shaped, 1.5 to 2 mm. long, glabrous within; lobes ovate, acute, 2.5--3.5 mm. long, subequal, sericeous within as without, prominently nerved and dotted, spreading during flowering, then closing up vertically. *Stamens* 2 to 2.5 mm. long, those of the 1st and 2nd rows with ovate anthers with large slightly overlapping cells and slightly villous filaments and connective; those of the 3rd row with

oblong anthers and with two cordate or sagittate stipitate glands from the base or a little above it, the base and the filaments villous; staminodes of 4th row cordate-sagittate, glabrous, 1.5 mm. long, villous-stipitate. *Ovary* obovoid, rounded at top, glabrous; style slender; stigma large, peltate. *Fruit* an ellipsoid berry, subtruncated at apex, 10—15 mm. long, 5—7 mm. in diameter, seated on and partly immersed in the cupular enlarged perianth-tube and persistent lobes, the cupule 5 mm. in diameter; pericarp smooth, dull, obscurely ribbed. Blume in Rumph. I. 41, tt. 17, 18; Miq. Fl. Ind. Bat. I. i, 897; Meissn. in DC. Prodr. XI. i, 19 var. *a*; Nees in Wall. Pl. As. Rar. II. 73; Wall. Cat. 2583 E; Wight Ic. t. 122; Kurz For. Fl. II. 287; Hook. f. Fl. Br. Ind. V. 130; Koord. & Val. Bijdr. X. 75. *C. nitidum*, Bl. Rumph. I. 35, t. 15; Hook. f. l.c. *C. Griffithii*, Meissn. l.c. 19. *Laurus nitida* Roxb. Fl. Ind. II. 300; Wall. Cat. 2582 excl. B. *Laurus malabathrum*, Wall. Cat. 2583A.

PENANG: *Wallich* 2573A!; *Phillips*!; *G. King*!; *Curtis* 156! 1548! 2252!. PROVINCE WELLESLEY: *Ridley* 9381!. PERAK: various places up to 1400 m. alt. *Wray* 274!, 556!, 1222!, 2674!, 2768!, 3088!, 3175!, 3328!; *King's Collector* 425!, 5705!, 6456!, 6510!, 7603!; *Scortechini* 323!, 1381!. SELANGOR: at Bukit Kuta, *Good-enough* 10540!; at Kwala Lumpor, *Curtis*! *Ridley* 15581!. PAHANG: at Pekan, *Ridley* 1144. MALACCA: *Griffith* K.D. 4240!, 4242!, 4246!. *Maingay* K.D. 1242!, 1243!. SINGAPORE: *Hullett* 81!; *Ridley* 3370!, 4703!—DISTRIB. Burma, Java, Sumatra, Borneo, etc.

Kunstler (*King's Collector*) has sent from Larut his No. 3861! which seems to be undoubtedly this species, but the fruit and fruiting calyx are badly distorted by a fungoid disease.

4. CINNAMOMUM RIDLEYI, Gamble in Kew Bull. 218 (1910). An evergreen tree; branchlets dark purplish-brown, smooth, younger angular and grey-puberulous as are the lanceolate buds. *Leaves* chartaceous, opposite or subopposite; elliptic-lanceolate, long attenuate-acuminate at apex with a blunt acumen, acute at base; both surfaces glabrous, reddish-brown when dry, the upper shining; margin cartilaginous; 10—17 cm. long, 2.5—6 cm. broad; ribs 3, prominent, the midrib extending to the extreme apex, the side ribs starting from the base or up to about 5 mm. above it and vanishing at the base of the acumination; main nerves none except about 6 pairs arching outside the side ribs; transverse nervules many, subparallel, arched; reticulation obscure; petiole nearly black, 10—15 mm. long. *Flowers* in grey-tomentose pedunculate axillary or

lateral branching panicles up to 10 cm. long on the upper branchlets; branches subopposite, slender, ending in 7-flowered dichasia; bracts minute, lanceolate, deciduous; pedicels slender; buds obovate. *Perianth*-tube short, villous within; lobes ovate, 2.5 mm. long, villous within. *Stamens* with subglabrous filaments; those of the 1st and 2nd rows 2 mm. long, spatulate, with oblong anthers and small upper cells; those of the 3rd row also 2 mm. long, bearing a pair of cordate sessile glands attached near the middle of the filaments; staminodes of 4th row cordate, 1 mm. long, villous-stipitate. *Ovary* ovoid, glabrous; style slender; stigma peltate, lobed. *Fruit* ovoid, apiculate, 10 mm. long, 7—8 mm. in diameter, seated on the cup-shaped glabrous enlarged perianth-tube about 5 mm. in diam. at mouth, the mouth entire, the lobes deciduous; pericarp black when dry, shining.

SINGAPORE: at Changi road, *Ridley* 4823 !.

This species has puzzled me much: it comes near *C. vimineum* in the acumination of the leaves and in inflorescence it resembles *C. Lampongum* and *C. rhyncophyllum* which are very near each other. The fruiting sheet (Herb. Singap.) bears on its label only 'Singapore' but no collector's name. The leaves resemble those of *C. pauciflorum*, but the inflorescence is quite different.

5. CINNAMOMUM RHYNCOPHYLLUM, Miq. Fl. Ind. Bat. I. i. 895 (1855). A small tree reaching 15 m. in height of stem and a diameter of 30—40 cm.; branchlets slender, subtetragonous, pale brown or greyish, uppermost grey-puberulous as are the conical leaf-buds. *Leaves* chartaceous, opposite or subopposite, aromatic, smelling of cardamoms (Wray); elliptic or elliptic-oblong, the apex with a long (1—2 cm.) straight or oblique acumen obtuse at tip, the base acutely attenuate; both surfaces very pale when dry, glabrous, the upper shining, the lower dull glaucescent; 12—18 cm. long, 4—6 cm. broad; ribs 3 prominent, the outer pair from the top of the petiole sometimes following the margin for a short distance, then about half-way between the midrib and margin to end just below the acumen; nerves outside this pair many, oblique or not, joining in an intramarginal looped nerve; transverse nervules many, regular, subparallel, slightly arched; reticulation finely areolate; petiole rather stout, 7—14 mm. long. *Flowers* pale yellow, waxy-looking, in grey-tomentose pedunculate axillary branching panicles up to 17 cm. long; branches many, subopposite, slender, ending in 7-flowered dichasia, the middle flowers usually the largest and perhaps alone fruit-bearing; bracts lanceolate, minute, caducous; pedicels slender; buds globose.

*Perianth*-tube short, villous within; lobes ovate, acute, 3 mm. long, thickened at the back. *Stamens* with villous broad filaments; those of the 1st and 2nd rows 1.5 to 2 mm. long spatulate with ovate anthers and minute upper cells; those of the 3rd row 2 mm. long with oblong anthers and submarginal cells, the upper very minute, the glands obliquely cordate glabrous, very shortly stipitate, attached near the middle of the filaments; staminodes cordate, glabrous within, villous without, 1 mm. long. *Ovary* ovoid-globose; style rather slender; stigma obliquely peltate, 2—3-angled. *Fruit* not seen. Meissn. in DC. Prodr. XV. i. 11.

PERAK: at Tapa, Wray 1304!; in open forest near Larut up to 150 m. alt., King's Collector 3287!.—DISTRIB. Sumatra.

6. CINNAMOMUM LAMPONGUM, Miq. Fl. Ind. Bat. Suppl. 358 (1862). A medium-sized tree; branchlets slender, terete, uppermost quadrangular, minutely grey-puberulous; leaf-buds conical, grey-silky-pubescent. *Leaves* pergamaceous, opposite or subopposite, yellowish when dry; oblong-lanceolate or elliptic-lanceolate, long acuminate at apex, acute at base; upper surface shining glabrous, lower dull glaucous; 5—15 cm. long, 2—4 cm. broad; ribs three raised on both surfaces, the midrib produced to the tip of the acumen, the side nerves to its base; nerves outside them many, short, united in a looped intramarginal nerve; transverse nervules subparallel, arcuate, indistinct; petiole 5—10 mm. long, dark. *Flowers* in axillary or subterminal grey-brown pubescent panicles up to 12 cm. long, the rhachis quadrangular; branches few spreading, ending in dichasia; pedicels slender. *Perianth*-tube very short; lobes ovate-orbicular, obtuse, 1.5 cm. long, villous within, 5-nerved. *Stamens* small, with very small upper anther-cells and slender filaments; those of 1st and 2nd rows with ovate obtuse anthers; those of the 3rd row with smaller anthers and a pair of large cordate stipitate glabrous glands inserted at the middle of the villous filaments; staminodes of 4th row small, ovate-acuminate, villous-stipitate. *Ovary* ovoid, attenuated into a rather thick style; stigma with 2—3 recurved lobes. *Fruit* ovoid, truncate, 10—12 mm. long, 7—8 mm. in diameter, seated on the enlarged persistent thickened cup-shaped perianth tube 6 mm. long, 10 mm. in diam. crenulate on the margin; pericarp yellowish when dry, smooth, shining.

PERAK: in open jungle up to 240 m. alt. near Larut, King's Collector 4802!, 6595!.—DISTRIB. Sumatra (Teysmann, Forbes 2969!.)



The description of the fruit is taken from K.C. 4802 which has rather smaller and narrow leaves and shorter inflorescence, but seems to be this species.

7. *CINNAMOMUM VIMINEUM*, Nees in Wall. Pl. As. Rar. II. 76 (1831). A small evergreen tree; branchlets slender, terete, reddish brown, glabrous, younger subcompressed, minutely hoary-pubescent as are the innovations. *Leaves* opposite or subopposite, chartaceous; lanceolate, long acuminate at apex with an obtuse acumen, acute at base; both surfaces glabrous, upper shining, lower pale; 8—12 cm. long, 2—4 cm. broad; ribs 3, divergent from the base or slightly above it, the midrib extending to the apex, the side ones to about 2—3 cm. below it; main nerves none; transverse nervules many, irregular, very obscure, enclosing an obscure areolate reticulation; petiole slender, 7—10 mm. long, glabrous. *Flowers* in short lateral few-flowered panicles from the internodes of upper branchlets, glabrous, very small. *Fruit* ovoid, apiculate, 10 mm. long, 7.5 mm. in diam., seated on the cup-shaped glabrous smooth enlarged perianth with smooth margins, this again supported by the obconic glabrous enlarged pedicel 7 mm. long; pericarp smooth, yellow when dry. Nees Syst. Laur. 82; Meissn. in DC. Prodr. XV. i. 19; Miq. Fl. Ind. Bat. I. i. 904; Hook. f. Fl. Br. Ind. V. 131. *Laurus viminea*, Wall. Cat. 2578.

PENANG: Porter!; on West Hill at 750 m. alt., Curtis 1571!

8. *CINNAMOMUM DESCHAMPSII*, Gamble in Kew Bull. 219 (1910). A tree; branchlets slender, terete, dark brown; leaf-buds broadly ovoid, 3 mm. long, densely white-silky. *Leaves* subcoriaceous, opposite or subopposite; elliptic-ovate or -oblong, obtuse at apex and glandular-apiculate, rounded or slightly attenuate at base; both surfaces glabrous, ashy-grey when dry, the upper shining the lower glaucous; margin cartilaginous slightly recurved; 7—11 cm. long, 4—6 cm. broad; ribs 3, slightly raised on the upper surface, the midrib straight to the apical gland, the side pair from the base or very little above it, widely curving upwards to about three-fourths of the distance to the apex where they break into slender loops and sometimes join a single pair of slender nerves; outside nerves about 3, indistinct, widely looped; transverse nervules subparallel, arched, indistinct as is the areolate reticulation; petiole black, 5—10 mm. long. *Flowers* moderate-sized in slender lax pedunculate axillary greyish-silky panicles up to 15 cm. long; peduncles filiform, 4—7 mm. long; branches also filiform ending in dichasia of usually 7 flowers;



pedicels very slender, about 5 mm. long. *Perianth*-tube very short, scarcely 1 mm. long, glabrous within; lobes oblong, acute, 2—3 mm. long, grey-silky-pubescent on both sides. *Stamens* slender, 1—2 mm. long, the filaments nearly glabrous; those of the 1st and 2nd row, with oblong anthers and large cells scarcely overlapping; those of the 3rd row with narrower anthers, the lower cells large the upper minute; the basal glands thick, reniform-cordate, glabrous, stipitates attached a little above the base of the filaments; staminodes of 4th row sagittate, 1 mm. long, villous-stipitate. *Ovary* obovoid; style rather thick; stigma peltate. *Fruit* not seen.

PENANG: roadsides in the mountains, *Deschamps*!. SINGAPORE: in garden jungle, *Ridley* 12595!

Ridley says he believes this to be an introduced plant, perhaps coming from S. India, perhaps from China, but I cannot identify it.

9. CINNAMOMUM JAVANICUM, Blume Bijdr. 570 (1825). An evergreen tree or shrub; branchlets subquadrangular, densely pale tawny-tomentose when young, darker and nearly black when old; buds small. *Leaves* chartaceous, subopposite, very prominently nerved; elliptic or elliptic-oblong, abruptly long acuminate at the apex, cuneate or attenuate at the base; upper surface shining glabrous except on the ribs which are villous when young, bullate between the transverse nervules, lower surface long-villous especially on the ribs and nervules, the hairs pale brown when young darker when old; margin cartilaginous; 17—40 cm. long, 1—12 cm. broad; 3-ribbed from about 5 mm. (1—2 cm. when young) above the base, the ribs very strong and raised on both surfaces, the midrib reaching to the tip of the acumen, the side ribs to a little above its base, outside them and close to the margin a regularly looped intramarginal nerve; transverse nervules many, regular and straight or branched forming ladder-like bars between the ribs and between the outer ribs and the looped nerve, impressed above when young, not so when old; reticulation minutely netted, prominent when young; petiole stout, densely tawny-tomentose, 1—3 cm. long. *Flowers* in tawny-tomentose subsessile fasciculate branched panicles up to 15 cm. long; rhachises quadrangular; branches dichotomous, ending in dichasia; pedicels stout, up to 3 mm. long; buds oblong, up to 5 mm. long. *Perianth*-tube funnel-shaped, 1—1.5 mm. long, thick-walled, pubescent within; lobes ovate-oblong, 3.5—4 mm. long, also pubescent within, the mouth nearly closed. *Stamens* 2 mm. long, the filaments broad villous, the anthers elliptic; those of the

1st and 2nd rows rather larger than those of the 3rd row, the upper cells small; those of the 3rd row bearing a little above the base two large cordate or sagittate glabrous glands; staminodes of the 4th row slender, 1.25 mm. long, the stalk villous, the tip cordate, glabrous. *Ovary* ovoid nearly glabrous; style rather thick, twisted; stigma with 2—3 recurved lobes. *Fruit* subglobose, slightly compressed laterally, about 25 mm. in diam.; pericarp thick, fleshy, the lower half immersed in a thick cupule formed by the enlarged perianth-tube; embryo globose, 15 mm. in diam. Blume Rumph. I. 42, t. 19; Meissn. in DC. Prodr. XV. 1. 10; Hook. f. Fl. Br. Ind. V. 130; Koord. & Val. Bijdr. X. 73. *C. sulphuratum*, Nees in Wall. Pl. As. Rar. II. 74, and Syst. Laur. 55 *in part*; Miq. Fl. Ind. Bat. I. i. 891.

SINGAPORE: at Changi, Ung Mokio, Bukit Timah and Garden jungle, *Ridley* 6453!, 8101!, 15621!; *Cantley* 22!; *Walker* 29!.  
DISTRIB: Java, Borneo (*Teysmann* 8687).

Ridley says flowers of this beautiful plant are very rare; only one of his specimens, without number or locality, possesses them. The description of the fruit is taken from Koorders and Valetton.

10. CINNAMOMUM MOLLISSIMUM, Hook. f. in Fl. Br. Ind. V. 131 (1886). A large evergreen shrub or small tree reaching 10—12 m. in height and 20—30 cm. in diam. of stem, very aromatic; branchlets slender, subquadrangular, brown, lenticellate, puberulous, the uppermost and innovations densely villous with pale golden-brown spreading hairs as are the ovate leaf-buds, 5 mm. long. *Leaves* chartaceous to coriaceous, opposite or subopposite, frequently bullate; elliptic, elliptic-oblong or lanceolate, attenuately long acuminate at apex and often sphacelate, acute or somewhat rounded at base; upper surface pale green, glabrous except on the ribs of young leaves, lower greyish-villous, ultimately nearly glabrous; margins reflexed; 10—25 cm. long, 2.5—10 cm. broad; ribs three, deeply impressed above, the outer pair from a little (3—7 mm.) above the base, regularly curved almost or quite to the apex; nerves outside these 4—6 on each side obliquely curving to and along the margin and joined in small loops; transverse nervules distant, irregular, branching; reticulation only conspicuous when young; petiole stout, densely villous, 10—15 mm. long, channelled above. *Flowers* cream-coloured, small, in few-flowered long-peduncled densely golden-villous panicles 5—10 cm. long; peduncles at least two-thirds of the length; branches very few, ending in small 7-flowered dichasia; bracts minute, lanceolate; pedicels short; buds globose, grey-

pubescent. *Perianth*-tube campanulate, 2—3 mm. long, white-puberulous within; lobes ovate, acute, 2·3—3 mm. long, the outer very slightly the longer, densely golden-villous within, enlarged and thickened in fruit as is the pedicel. *Stamens* with broad villous filaments; those of the 1st and 2nd rows 1·5—2 mm. long, with oblong anthers and large lower cells, the tip subapiculate; those of the 3rd row as long with narrower anthers, the lower cells opening more or less laterally, the glands obtuse at apex, unequally cordate or sagittate at base, shortly stipitate, attached at the middle of the filaments; staminodes of the 3rd row cordate, glabrous on the inner, villous on the outer side, 1·25 mm. long. *Ovary* ovoid, sparsely pubescent, attenuate into a thick style; stigma obliquely peltate. *Fruit* ovoid, glabrous, black when dry, obtuse at apex, 1—1·5 cm. long, .75 cm. broad, seated on the enlarged thickened calyx-tube which is strongly keeled and glabrescent.

PENANG: at West Hill, *Curtis* 308!. PERAK: at Thaipeng, *Wray* 2669!; in open forest at Larút up to 250 m. alt. *King's Collector* 5568!, 6013!.

11. CINNAMOMUM SCORTECHINII, Gamble in Kew Bull. 219 (1910). An evergreen tree with thin dark brown fairly smooth bark; branchlets dark brown, terete, the uppermost subquadrangular ferruginous-tomentose; leaf-buds ovoid, densely grey-tomentose. *Leaves* coriaceous, opposite or subopposite; elliptic or elliptic-lanceolate, acute or shortly and obtusely acuminate at apex, somewhat attenuate or rounded at base; upper surface glabrous except on the ribs, lower densely greyish-tawny tomentose; margins reflexed; 7—12 cm. long, 2·5—5 cm. broad; ribs 3, impressed above, the side pair branching from the midrib at from 5—7 mm. above its base, not always opposite, curved upwards to end a little below the apex; nerves outside the side ribs about 3—5 on either side, curved obliquely to the margin and joining in loops; transverse nervules subparallel, slightly arched, in old leaves very indistinct as is the reticulation; petiole stout, tawny-tomentose, 10—15 mm. long. *Flowers* rather large, in few-flowered tawny-pubescent axillary panicles up to 7 cm. long; peduncle slender; branches short bearing a pair of 3-flowered dichasia; pedicels short, about 2 mm. long; buds globose. *Perianth*-tube short, scarcely 2 mm. long, glabrous within; lobes ovate, acute, densely tawny villous within, 2—3 mm. long, the outer slightly the longer. *Stamens* rather thick, with broad pubescent filaments; those of the

1st and 2nd row spatulate, 2—2.5 mm. long, the anther cells large, scarcely overlapping; those of the 3rd row with narrow anthers, the cells opening more or less sideways, the 2 reniform glabrous glands sessile about half-way up the filaments; staminodes of the 4th row sagittate, 1.5—2 mm. long, broadly pubescent-stipitate. *Ovary* obovoid, villous, rounded at top; style rather thick, villous; stigma peltate. *Fruit* (immature) an ovoid berry seated on the persistent cupshaped perianth-tube, truncate at the mouth.

PERAK: at camp on Ulu Batang Padang at 1500 m. alt. Wray 1520!; *Scortechini* 322!.

Wray's specimens have rather thicker and smaller leaves than *Scortechini*'s and are grey while the latter are reddish but they agree in shape, nervation and pubescence; the difference being probably only due to difference of level.

12. CINNAMOMUM AUREO-FULVUM, Gamble in Kew Bull. 220 (1910). A bush; the branchlets slender, uppermost angular, densely golden-tawny-pubescent as are the innovations. *Leaves* subcoriaceous subopposite; elliptic-lanceolate, attenuately long-acuminate at apex, acuminate at base; upper surface dull, softly appressed grey-pubescent, lower densely golden-tawny-pubescent; 6—8 cm. long, 1.5—3 cm. broad; 3-ribbed from about 3—5 mm. above the base, the midrib reaching to the tip of the acumen, the side ribs scarcely to its base; transverse nervules subparallel, arched, obscure because hidden in the pubescence; petiole slender, 1.5—2.5 cm. long, densely pubescent. *Flowers* in slender tawny-pubescent peduncled dichasia from the axils of upper leaves and up to 4 cm. long; peduncle about 3 cm. long; branches about 1 cm., flattened; bracts caducous; pedicels 2 mm. long; buds ovoid. *Perianth*-tube campanulate, 1 mm. long, articulate with the oblong rounded 2 mm. long subequal lobes, all tawny-pubescent. *Stamens* small, 1.5—2 mm. long; filaments broad, villous; anthers ovate, the upper cells very small, those of the 3rd row bearing half-way up the filaments a pair of rather large reniform glabrous glands; staminodes of the 4th row 1.25 mm. long, the tip cordate, the stalk pubescent. *Ovary* subglobose, wrinkled, sparsely hispid; style slender; stigma acute. *Fruit* not known.

SELANGOR: at Hulu Semangko, on top of the hill, *Ridley* (?) 12103!, 15598!.

13. CINNAMOMUM CINEREUM, Gamble in Kew Bull. 220 (1910). A tree reaching 15—20 m. in height and the stem with a diameter of 40—

50 cm.; branches spreading; branchlets slender, terete, glaucous-grey. *Leaves* sub-coriaceous, undulate, opposite or sub-opposite; lanceolate, acute at apex, subcuneate at base; both surfaces glabrous, the upper shining dark green when fresh, olive green when dry, the lower grey-cinereous as are the young leaves on both sides; margins cartilaginous; 8–15 cm. long, 3–5 cm. broad; ribs 3, the midrib slender in young, strong in old leaves, the side pair branching from the midrib at from 5 to 15 mm. above the base, sometimes not quite opposite, curving to about  $\frac{2}{3}$  of the length of the blade and then joined by the main nerves and breaking up into loops; main nerves from the midrib about 4–6 pairs, rather obscure; reticulation prominently areolate in young leaves, hardly apparent in old ones; petiole rather stout, 1–1.5 cm. long, channelled above. *Flowers* pale yellow, in slender long-peduncled grey-pruinose panicles or 7- or 15-flowered dichasia, reaching 15 cm. in length; peduncles very slender, somewhat flattened as are the branches and pedicels; buds obovoid, very minutely puberulous. *Perianth*-tube rather slender, 2 mm. long glabrous within; lobes ovate, 2.5 mm. long, white-villous within specially at the base. *Stamens* slender, 2–2.5 mm. long; those of the 1st and 2nd rows with oblong anthers and anther-cells and nearly glabrous filaments; those of the 3rd row with smaller anthers, filaments villous at base and 2 large uniform glabrous stipitate glands, truncate or lobed at apex, inserted about  $\frac{1}{3}$  of the way up the filaments staminodes of 4th row 1.5 mm. long with ovoid acute heads and villous filaments. *Ovary* ovate-oblong, narrowed into the slender style; stigma peltate, oblique. *Fruit* not known.

PERAK: at Waterfall Hill at about 360 m. alt., Wray 2629!; in dense jungle near mountain streams at 300–450 m. alt. near Thaiping, King's Collector 8515!.

14. CINNAMOMUM INUNCTUM, Meissn. in DC. Prodr. XV. 1. 25 (1864). A tree; branchlets slender, black when dry; leaf-buds lanceolate, glabrous. *Leaves* membranous or chartaceous, alternate or sub-opposite; ovate or elliptic, obtuse or bluntly acuminate at apex, rounded or attenuate, usually unequally, at base; both surfaces pale when dry, glabrous; 5–11 cm. long, 3–5 cm. broad; midrib slender, prominent beneath; main nerves faint, 6–9 pairs, the lowest pair frequently opposite and curved to more than halfway up, the rest joining near the margin in small loops, the axils usually bearing a pitted gland; reticulation minutely areolate, prominent under the lens; petiole slender, 1–2.5 cm. long. *Flowers* small, up

to 10 mm. broad when open, in slender few-flowered axillary or lateral glabrous panicles up to 8 cm. long; peduncles slender or filiform; branches sub-opposite, subumbellate; pedicels slender, 5 mm. long. *Perianth*-tube funnel-shaped, short, glabrous within; lobes ovate-oblong, obtuse, up to 2 mm. long, white-villous within, deciduous after flowering. *Stamens* very small; the lower anther cells elliptic, the upper usually circular; those of the 1st and 2nd rows .75—1.25 mm. long, the anthers obtuse, the filaments slender, villous; those of the 3rd row similar and with a pair of reniform subsessile glands close to the base outside the filaments; staminodes of the 4th row cuneiform, stipitate. *Ovary* ovoid; style rather thick, curved; stigma peltate. *Fruit* an ovate berry the size of a pea, seated on a funnel-shaped cupule (Meissn.). Kurz For. Fl. II. 289; Hook. f. Fl. Br. Ind. V. 135. *Camphora inuncta*, Nees in Wall. Pl. As. Rar. III. 32 and Syst. Laur. 89; Miq. Fl. Ind. Bat. I. 1. 905. *Tetranthera camphoracea*, Wall. M.S.

MALACCA (?): Griffith K.D. 4256 !; Maingay K.D. 1244 !.—DISTRIB. Burma (Tavoy).

15. CINNAMOMUM PARTHENOXYLON, Meissn. in DC. Prodr. XV. i. 26 (1864). A very large tree with straight trunk reaching 30 to 45 m. in height and a diameter of 1 m. and perhaps more; branches spreading; branchlets moderately thick, nearly black when dry, the uppermost angular, glabrous; leaf-buds lanceolate, inflorescence buds with large silky-pubescent deciduous scales. *Leaves* very variable in shape and texture, young ones thin, red when first open, the old ones subcoriaceous, alternate; elliptic or elliptic-ovate or -obovate, sometimes lanceolate, acute or acuminate at apex, acute or rounded and usually unequal at base; both surfaces glabrous, the upper dull or slightly shining, the lower more or less glaucous; 6—12 cm. long, 3—6 cm. broad: midrib slender, not prominent; main nerves very irregular, about 6 to 8 pairs, not prominent, curving upwards to join in rather obscure loops near the margin; no glands in the nerve axils; reticulation areolate; petiole slender, 2—3 cm. long, usually channelled above. *Flowers* small, 10 mm. broad when open, light yellow, in lax slender axillary or lateral panicles up to 8 cm. long; peduncles and pedicels filiform, glabrous or the latter puberulous. *Perianth*-tube funnel-shaped, glabrous within; lobes elliptic-oblong, obtuse, nearly glabrous without, villous within, 2—2.5 mm. long, deciduous after flowering. *Stamens* minute, the anthers with nearly circular pores; those of the 1st and 2nd rows



with nearly orbicular anthers and short slightly villous filaments, .75 mm. long; those of the 3rd row 1.25 mm. long, very obtuse, with 2 large reniform sessile glands attached near the base outside the villous filaments; staminodes of the 4th row cuneiform or sagittate, stipitate, villous outside, 1 mm. long. Ovary ovoid, glabrous; style short; stigma large, peltate. Fruit a globose berry about 7 mm. in diam. seated on the truncate spreading cup-shaped enlarged perianth-tube, the fruiting pedicel long-funnel-shaped; exocarp thick, succulent, dark purple; endocarp crustaceous. Seed spherical; testa membranous; cotyledons hemispherical, enclosing the minute radicle. Kurz For. Fl. II. 289; Hook. f. Fl. Br. Ind. V. 135; Koord. & Val. Bijdr. XI. 82. *C. pseudo-Sassafras*, Meissn. l. c. 27. *C. ? malaccense*, Meissn. l. c. 27. *C. Neesianum*, Meissn. l. c. 26. *Parthenoxylon porrectum*, *pseudo-Sassafras* and *pruinatum*, Blume in Mus. Bot. Lugd.-Bat. I. 323; Miq. Fl. Ind. Bat. I. 1. 967. *Camphora Parthenoxylon*, Nees in Wall. Pl. As. Rar. II. 76; Benth. Fl. Hongk. 290. *C. pseudo-Sassafras*, Miq. in Zoll. Cat. 113, 114. *C. chinensis*, Nees Syst. Laur. 92. *Sassafras Parthenoxylon*, Nees Syst. Laur. 491; Wight Ic. t. 1832 (copied from Roxb.). *Persea pseudo-Sassafras*, Zoll. in Nat. Gen. Arch. II. 635. *Laurus Parthenoxylon*, Jack in Mal. Misc. I. 28; Wall. Cat. 2602. *L. pseudo-Sassafras*, Bl. Bijdr. 573. *L. porrecta*, Roxb. Fl. Ind. II. 308. *Phæbe latifolia*, Champ. in Kew Journ. Bot. V. 197.

PENANG: Wallich 2602!; Curtis 512!, 1038!, 1406!; J. Scott.!; King's Collector 1456!. PROVINCE WELLESLEY: at Tasik Glugor, Ridley 6968!, 12585!. DINDINGS: at Pangkore, Ridley 8377!. PERAK: at Lumut Dindings, Ridley 3044!; at Kinta and Gunong Bubu, King's Collector 7120!, 8354!; at lower camp, Gunong Batu Pateh, Wray 1072!. MALACCA: Maingay K.D. 1244!, 1512!. DISTRIB. Burma, Java, Sumatra, China.

In Herb. Singapore is a sheet collected by F. Dennys at Gunong Menkong Labar in the Federated States. The specimen has no flowers or fruit but the leaves are remarkable for being very thick. Leaves opposite or subopposite, very coriaceous; ovate, obtusely acuminate at apex, rounded at base and slightly decurrent; glabrous and shining on both surfaces; margins flat; ribs 3, flat, with a slender quite basal additional pair close to the margin and soon forming a looped intramarginal nerve; the inner ribs alongside the midrib for about 1 cm. then leaving it to curve upwards to about  $\frac{2}{3}$  of the length of the blade when they meet the first main nerves and break into loops; main nerves from midrib 3—4 pairs, faint, below them prominent not parallel transverse nervules; outside the ribs 6 or more outer nerves, short, meeting the intramarginal one; reticulation prominent, beautifully areolate; length



10—15 cm., breadth 5—8 cm.; petiole very stout 1—1.5 cm. long, bordered above by the decurrent margins of the blade. It seems to belong to *Cinnamomum*; but in the absence of flower and fruit this is not quite certain.

#### 7. ALSEODAPHNE, Nees.

Evergreen trees. *Leaves* alternate, often subverticillate or fasciated at the ends of the branchlets, penninerved. *Flowers* small, hermaphrodite, in axillary or subterminal panicles, the cymules of the branches often subumbellate. *Perianth*-tube short, continuous with the pedicel; lobes 6, subequal, the outer ones often slightly the smaller. *Stamens* 9 fertile, with 4-celled ovate-oblong anthers; those of the 1st row opposite the outer perianth lobes, and introrse; those of the 2nd row opposite the inner perianth-lobes also introrse; those of the 3rd row opposite those of the 1st row, extrorse, and with two usually large glabrous glands at the base a little behind; staminodes of the 4th row opposite the stamens of the 2nd row, large, glabrous on the inner side, stipitate, ovate or cordate. *Ovary* ovoid or globose, 1-celled, 1-ovuled; style rather slender; stigma peltate. *Fruit* an ellipsoid or globose berry, seated on the enlarged perianth-tube and usually persistent lobes and supported by the enlarged often red and warted pedicel (as in *Dehaasia*).—DISTRIB. India, China, Malay Islands and Peninsula, about 12 species.

Third row of stamens with glands distinct from the filaments, at their base.

Leaves membranous

Flowers in glabrous panicles, minute; berry ellipsoid 2.5 cm. long .. .. 1. *A. peduncularis*.

Flowers in grey-puberulous panicles, larger; berry globose 1.5 cm. long .. .. 2. *A. Wrayi*.

Leaves coriaceous

Drupe globose under 1.5 cm. in diameter; leaves under 12 cm. in length .. .. 3. *A. bancana*.

Drupe oblong-ellipsoid, 4—5 cm. long, 2 cm. in diam.; leaves over 20 cm. long .. .. 4. *A. petiolaris*.

Leaves very coriaceous, rarely under 15 cm. in length

Berry dull, black, ellipsoid, about 2 cm. long and 1 cm. broad .. .. 5. *A. pauciflora*.

Berry shining, brown, oblong-ellipsoid, 3.5 cm. long and 2 cm. broad, seated on the prominent enlarged perianth-tube, the lobes deciduous .. .. 6. *A. insignis*.

Berry pale brown, very scurfy and pustular, oblong-ellipsoid, 7—8 cm. long and about 4 cm. in diameter; perianth-tube not enlarged in a ring, its lobes persistent

7. *A. Ridleyi*.

3rd row of stamens with glands attached to the filaments above the base: leaves sub-membranous, pendulous, large, panicles subracemose with distant branches and few flowers .. ..

8. *A. pendulifolia*.

*Species imperfectly known* .. ..

9. *A. crassipes*.

1. *ALSEODAPHNE PEDUNCULARIS*, Hook. f. in Fl. Br. Ind. V. 144 (1886). A shrub or small tree, reaching 3 to 4.5 m. in height; branchlets white, slender, uppermost nearly black when dry; leaf-buds lanceolate, 5—6 mm. long, black when dry, with few scales. *Leaves* membranous, more or less fascicled at the ends of the branchlets; elliptic-lanceolate, obtusely subcaudate, acuminate at apex, acutely attenuate or cuneate at base; both surfaces glabrous, dark olive-green when dry; 10—20 cm. long, 3—7 cm. broad; midrib slender, raised on both surfaces; main nerves 6 to 10 pairs, slightly curved for about two-thirds of the distance to the margin and then joined by broad loops, prominent and pale beneath; transverse nervules few, irregular, easily visible beneath; petiole slender, 5—10 cm. long. *Flowers* minute, greenish yellow, in slender nearly glabrous pedunculate panicles from the axils of the uppermost leaves, 3—7 cm. long; peduncles subfiliform up to 4 cm. long; branches very slender ending in umbellate cymes of about 3—6 flowers; bracts subulate, bracteoles minute; pedicels subclavate; buds globose. *Perianth*-tube short; lobes nearly equal, ovate, 1—1.5 mm. long, glabrous without, puberulous within. *Stamens* very short, hairy, those of 1st and 2nd rows .75 mm. long with very short villous filaments; those of 3rd row similar but longer and with 2 ovate glabrous villously stipitate .5 mm. long glands at the base or a little behind; staminodes of the 4th row reniform, glabrous except on the back and for a villous tuft at base. *Ovary* globose, slightly villous; style thick, curved; stigma broadly peltate. *Fruit* an ellipsoid berry, 2.5 cm. long, 1.5 cm. in diameter, supported on the persistent perianth lobes and the much thickened cylindric straight or curved red pedicel, 2.4 cm. long; pericarp black when ripe, smooth. *Haasia peduncularis*, Nees Syst. Laur. 376; Meissn. in DC. Prodr. XV. I. 61; Miq. Fl. Ind. Bat. I. i. 930. *Mackilus peduncularis*, Nees in Wall. Pl. As. Rar. II. 70. *Persea peduncularis*, Nees Syst. Laur. 125 (excl. syn. *Rumph.*). *Laurus peduncularis*, Wall. Cat. 2596.

PENANG: *Wallich* 2596!. PERAK: *Wray* 3632!, 3683!, 3792!; *Scortechini* 536!; near Ulu Kerling and Ulu Selangor at 120 to 240 m. alt., *King's Collector* 7916!, 8632!, 8836!. SELANGOR: at Labu and Petaling, *Ridley* 7622!, 8492!; at Kwala Lumpur, *Mohamed* 1908!

2. *ALSEODAPHNE WRAYI*, Gamble in Kew Bull. 220 (1910). A tree, reaching 30 m. in height and a considerable girth; branchlets rather slender with greyish-white bark; leaf-buds lanceolate acuminate nearly 1 cm. long, black, with few scales. *Leaves* membranous, somewhat clustered at the ends of the branchlets; elliptic-lanceolate, obtusely rather long acuminate at apex, narrowed at base; upper surface glabrous, dull, olive-brown when dry, lower minutely puberulous and punctate finally glabrous; 7—12 cm. long, 3—5 cm. broad; midrib slender, slightly impressed and keeled above, raised beneath; main nerves 10—12 pairs raised beneath, rather irregular and usually oblique, curving to branch and meet near the margin in irregular loops; transverse nervules and reticulation clear but not prominent; petiole 1—1.5 cm. long, channelled above. *Flowers* pale green, about 5 mm. in diam. in pedunculate branching slender grey-puberulous panicles from the upper leaf-axils, about as long as the leaves and reaching 10 cm. in length and 5 cm. in breadth; peduncles slender, 4 to 5 cm. long; branch peduncles also slender, cymules 3—5-flowered; pedicels very slender, somewhat clavate, about 7 mm. long; bracts ovate, caducous; bracteoles minute, triangular; buds globose. *Perianth*-tube short, cup-shaped; lobes subequal or the outer very slightly the shorter, up to 2 mm. long, puberulous within as without. *Stamens* of 1st and 2nd rows slender, clavate, 2 mm. long, the filaments and connective villous; stamens of 3rd row as long but more slender and the 2 upper anther-cells very inconspicuous, glands at the base ovoid glabrous rather large; staminodes of 4th row oblong, glabrous except the tuft of hair at the base, about as large as the glands. *Ovary* ovoid, glabrous; style slender; stigma peltate. *Fruit* a globose or slightly ellipsoid berry 1.5 cm. in diam., seated on the persistent reflexed perianth and a clavate subtrigonal enlarged fleshy pedicel 2 cm. long; pericarp black, shining, thin; embryo depressed at apex.

PERAK: at Kota, *Wray* 2543!; in forest near Larut, *King's Collector* 5493!, 5917!

The leaves of this species resemble those of *A. peduncularis*, but the flowers are larger and different in many respects.

3. *ALSEODAPHNE BANCANA*, Miq. Fl. Ind. Bat. I. i. 915 (1855). *Tree* (?); branchlets moderately thick, greyish-brown, lenticellate uppermost more slender; leaf-buds ovate acute, with few shining whitish scales. *Leaves* coriaceous, usually fascicled at the ends of the branchlets; obovate, shortly obtusely acuminate at apex, cuneate at base; both surfaces glabrous, upper dark olive-green to black when dry, lower dull and somewhat reddish puberulous when young; margins slightly recurved; 10—20 cm. long, 5—9 cm. broad; midrib stout, prominent and raised on both surfaces; main nerves 10—12 pairs, the lowest faint, impressed above, raised beneath, at first nearly straight then curving upwards to meet at about 5 mm. from the margin in prominent loops; transverse nervules few, parallel; reticulation obscure; petiole stout, much wrinkled, 10—15 mm. long, bordered by the decurrent margins of the blade. *Flowers* very small, in slender subracemose panicles from the uppermost axils, about as long as the leaves; peduncles slender, 5—8 cm. long; branches short; cymules 3—5-flowered; pedicels slender, 4—5 mm. long; buds globose, 2 mm. in diam. *Perianth*-tube short, lobes subequal, the outer rather shorter than the inner, puberulous, obovate, obtuse. *Stamens* very minute; those of 1st and 2nd rows with nearly orbicular anthers and short broad pubescent filaments, .75 mm. long; those of 3rd row rather longer and narrower, the glands at their base large, white, glabrous; staminodes of 4th row ovate, acute, glabrous without, hairy at back, 5 mm. long. *Ovary* rounded; style short, thick; stigma peltate. *Fruit* a globose berry 1.5 cm. in diameter, seated on the persistent perianth lobes and a not much thickened warty enlarged pedicel; pericarp black, smooth, rather thin. Meissn. in DC. Prodr. XI. i. 28. *A. decipiens*, Hook. f. Fl. Br. Ind. V. 145.

SINGAPORE: Garden jungle and Bukit Timah, *Ridley*, 3369!, 4937!; at Chanchukang, *Ridley* 6156!, 6160!—DISTRIB. Bangka, (*Horsfield*!, *Kurz*!), Borneo (*Haviland* 3086!).

4. *ALSEODAPHNE PETIOLARIS*, Hook. f. in Fl. Br. Ind. V. 145 (1886). A large tree; branchlets subverticillate, very stout, lenticellate, dark brown, scurfy; buds short, conical. *Leaves* coriaceous; oblong or oblong-obovate, abruptly and sharply caudate-acuminate at apex, attenuate to nearly rounded at base: both sur-

faces glabrous, dark brown when dry, reticulate; margins slightly recurved; 20—30 cm. long, 12—18 cm. broad; midrib stout, impressed above, much raised beneath; main nerves 8—12 pairs, at first straight then curved to join in loops near the margin; transverse nervules many, prominent, enclosing the much netted reticulation, all the nerves and nervules raised on both surfaces; petiole very stout, 3—6 cm. long. *Flowers* in stout panicles reaching 20—30 cm. in length from the axils of the upper leaves, the branches rusty-puberulous, ascending; pedicels short, gradually thickening; bracts minute, caducous. *Perianth*-tube funnel-shaped, 1—1.5 mm. long; lobes subequal, 2.5 mm. long, rusty-puberulous without. *Stamens* short, nearly glabrous or only with sparse rusty hairs on the filaments, those of the 1st and 2nd rows obtuse, 1.5 mm. long; those of the 3rd row 2 mm. long with a pair of large glabrous glands at the base behind; staminodes of the 4th row ovate, small, sometimes 0. *Ovary* ovoid; style thick, puberulous; stigma large, capitate. *Fruit* an oblong-ellipsoid drupe 4—5 cm. long, 2 cm. in diam., the pericarp black when dry, supported on the persistent perianth-lobes, the pedicels thickened only to about 3 mm. in diam., rugose and scurfy. *Nothaphæbe? petiolaris*, Meissn. in DC. Prodr. XV. 1. 59.

PAHANG: at Telom, *Ridley* 13782!—DISTRIB. India (Assam), Burma.

5. *ALSEODAPHNE PALUDOSA*, Gamble in Kew Bull. 221 (1910). A very large tree reaching 24—30 m. in height and about 1 m. in diameter of stem; branchlets very stout, rough, dark grey; leaf-buds conical, glabrous, about 5 mm. long, with many outer scales. *Leaves* very coriaceous, fascicled at the ends of the branchlets; obovate, obtuse or rather deeply emarginate at apex, long-cuneate at base; upper surface glabrous shining, lower glaucous; margins recurved; 20—25 cm. long, 7—9 cm. broad; midrib very stout, slightly raised above and prominently channelled, nearly flat beneath; main nerves 15 to 17 pairs, rather faint, impressed above, slightly raised beneath, lower ones at about 50° with the midrib, upper at 70°, only curved near the margin or hardly looped; transverse nervules few, irregular, not visible on the upper surface; reticulation minutely areolate, indistinct beneath, invisible above; petiole stout, 3—4 cm. long, bordered by the decurrent margins of the blade. *Flowers* imperfectly known; fruiting inflorescence of racemose panicles from the uppermost axils reaching 10—15 cm. in length; peduncles and rhachis prominently warted; enlarged pedi-

cels obconic, slightly flattened, glaucous and much warted, 2—3 cm. long, surmounted by the prominently persistent perianth-lobes and stamens. *Perianth*-lobes triangular, 5 mm. long and glabrous in fruit, the outer ones slightly the smaller. *Stamens* in fruit very slender, clavate, glabrous; those of 1st and 2nd rows 3 mm. long; those of 3rd row 4 mm. long and with 2 rather large rounded glands; staminodes of 4th row cordate, glabrous, stipitate. *Fruit* (young) an oblong ellipsoid berry about 2 cm. long and 1 cm. in diam., the top depressed; pericarp tough, dull, black when dry.

PERAK: in dense jungle on low wet ground in Larut, *King's Collector* 5378!

This species is very near *A. insignis* and agrees with it very closely in the leaves, but in this the nerves are impressed while in that they are raised; the midrib also differs; while *insignis* seems only to have the apex sometimes slightly emarginate. The fruit of *insignis* has a prominent annular ring and the perianth-lobes which are not very persistent are quite small, while in *paludosa* there is no ring and the lobes are large and prominent.

6. *ALSEODAPHNE INSIGNIS*, Gamble in Kew Bull. 221 (1910). A very large tree reaching 24 to 30 m. in height and about 1 m. in diam. of stem; branchlets very stout, dark brown; leaf-buds conical, about 5 mm. long, with few lanceolate glabrous scales. *Leaves* very coriaceous, fascicled at the ends of the branchlets; oblong or obovate or oblanceolate, rounded or very obtusely acute at apex, cuneate or attenuate, often somewhat decurrent at base; both surfaces glabrous, the upper shining, the lower bluish-green; margins thickened; size variable from 12—15 cm. by 5—7 cm. and somewhat rounded at base, to 15—35 cm. by 5—10 cm. and narrowed at base; midrib very stout, prominent, raised on both surfaces; main nerves 12—15 pairs slightly raised on both surfaces, starting at about 70° with the midrib and curved nearly to the margin where they join in loops; not prominent on the upper, but very evident on the lower surface, joined by rather inconspicuous transverse nervules and a minutely netted reticulation; petiole stout, 3—6 cm. long, channelled above by the continuation of the margins of the blade. *Flowers* light green with yellow stamens, in subterminal, erect, stout, minutely puberulous panicles reaching 15 cm. in length; peduncles and rhachis angular, nearly black; branches short, tawny-puberulous, subumbellate; bracts small, ovate-lanceolate, caducous; pedicels stout, trigonous; buds clavate; fruiting panicles from the uppermost leaf-axils 10—30 cm. long; peduncles in fruit very stout. *Perianth*-lobes puberulous, the outer

3 shorter than the inner 3 which are 2.5—3 mm. long and ovate. *Stamens* rather slender, those of the 1st and 2nd rows 2 mm. long, clavate; those of 3rd row similar but larger, and with 2 rather large glabrous glands at the base; staminodes of 4th row ovate-cordate, glabrous on the inner, villous on the outer face and on the short stalk, 1—1.5 mm. long. *Fruit* shining, glabrous, bright green, chestnut brown when dry, oblong-ellipsoid, obtuse, reaching 3.5 cm. in length and 2 cm. in diam.; seated on the much enlarged perianth-tube which then assumes the form of an annular flattened disk nearly 2 cm. in diam., this again is supported by the clavate, flattened or trigonous, enlarged pedicel 2 cm. long, green mottled with brown spots when fresh, glaucescent and prominently warted when dry.

PERAK: near Larut in dense forest up to 300 m. alt., King's Collector 6608!, 6958!, 7273!, 8451!

7. *ALSEODAPHNE RIDLEYI*, Gamble in Kew Bull. 222 (1910). A medium-sized tree; branchlets very stout, light brown, lenticellate; leaf-buds short, with many scales. *Leaves* very coriaceous, clustered at the ends of the branchlets; elliptic-oblong or -obovate, often unequal-sided, obtuse or very minutely apiculate at apex, rounded or attenuate at base; both surfaces glabrous, the upper shining, the lower glaucous; 13—25 cm. long, 5—13 cm. broad; midrib very stout, flattened above or slightly raised, raised beneath; main nerves 12 to 15 pairs, irregular, at from 60° to 70° with the midrib, curving to and along the margin but scarcely looped, very slightly raised above, more so beneath, joined by irregular transverse nervules and an areolate reticulation hardly visible above but more prominent beneath; petiole very stout, enlarged and wrinkled at base, 2—4 cm. long, upper part bordered by the decurrent blade-margins. *Flowers* in glabrous panicles from the upper leaf axils, the panicles reaching 10 cm. long and 5 cm. broad; peduncle rather short, flattened; branches few, 3-chotomous; bracts ovate acute 2—3 cm. long; cymules few-flowered; pedicels clavate, enormously thickened in fruit as is the rhachis; buds globose. *Perianth*-tube short; lobes ovate, the outer slightly smaller. *Stamens* very small, clavate, rounded; glands of 3rd series ovoid; staminodes of 4th series ovate, glabrous. *Fruit* a very large oblong ellipsoid berry with depressed top, 7—8 cm. long and about 4 cm. in diameter, seated on the much thickened pedicel which is often 1—5 cm. thick at top; pericarp 3—5 mm. thick, densely covered as are the enlarged rhachis and pedicel with tawny-brown scurf and raised pustules.



SELANGOR: at 15th mile Pahang track at about 300 m. alt.,  
*Ridley* 8532 !

8. *ALSEODAPHNE PENDULIFOLIA*, Gamble in Kew Bull. 222 (1910). A tree, reaching a height of 12 to 18 m. and a diameter of stem of 20—40 cm.; branchlets very stout, at least 10 mm. in diam. at apex, scarred and wrinkled; leaf-buds ovoid, glabrous, 5 mm. long, with spreading scales. *Leaves* sub-membranous, fasciated at the ends of the branchlets and 'hanging downwards in the shape of an umbrella' (*King's Collector*); obovate or oblanceolate, obtuse or very shortly acuminate at apex, long cuneate at base; both surfaces dull, reddish-brown when dry, the lower paler, glabrous; 17—35 cm. long, 5—11 cm. broad; midrib slender, little raised on either surface; main nerves 15 to 20 pairs, slender, curving upwards to and along the margin, joined by many rather irregular transverse nervules and then again by an irregularly areolate reticulation, prominent under the lens especially beneath; petioles slender, curved, 2—4 cm. long, bordered above by the decurrent margins of the blade. *Flowers* pale yellow, about 5 mm. broad when open; in long, very lax glabrous subracemose panicles from the axils of the fasciated leaves, and nearly as long as the leaves; peduncle rhachis and branches somewhat flattened, black when dry; branches slender, few-flowered, ending in 3-flowered umbels; pedicels slender, clavate at tip, 7 mm. long; buds glabrous, obconic. *Perianth*-tube funnel-shaped, thick; lobes ovate acute, the outer 1 mm. the inner 2 mm. long, sparsely silky within. *Stamens* 1.5—2 mm. long, with the anther-cells unequal, the upper pair very small; those of the 1st and 2nd rows with ovate anthers and broad puberulous filaments; those of the 3rd row with oblong anthers, the upper cells minute, the filaments puberulous, and the 2 reniform glabrous large glands subsessile a little above the broad filament base; staminodes of 4th row cordate, glabrous, broadly stipitate. *Ovary* ovoid, attenuate into the short style; stigma small, obtuse. *Fruit* (very immature) a globose glabrous drupe seated on the enlarged perianth and its enlarged pedicel.

PERAK: in dense forest, chiefly of bamboo, near Ulu Bubong and Ulu Kerling, up to 200 m. alt., *King's Collector* 8785!, 10623!. Without locality, *Burn-Murdoch* in Herb. Singap. Vern. 'Medang Payong' !

*Species imperfectly known.*

9. *ALSEODAPHNE CRASSIPES*, Hook f. Fl. Br. Ind. V. 146 (1886). A tree?, branchlets stout, woody, with ashy bark, upper-

most and innovations rusty-tomentose. *Leaves* coriaceous, alternate or sub-opposite, falcately recurved; elliptic-lanceolate, acuminate at apex, cuneately narrowed at base; both surfaces glabrous, yellowish when dry, upper shining; 10—13 cm. long, 2·5—4 cm. broad; midrib slender, main nerves 6—8 pairs, raised on both surfaces, at first straight then branching and joining in loops at some distance from the margin; reticulation sparse but prominent; petiole slender, 1·5—2·5 cm. long. *Fruiting peduncles* numerous, 7—10 cm. long, very strict, thickened upwards, as rigid and woody as the branchlets and thicker at the top than the pedicel is broad; pedicels 4—6 mm. long, cylindric, black. *Fruit* smooth, ellipsoid, 15—18 mm. long, 10—12 mm. in diam., dark blue-black, pruinose, with red pedicel.

MALACCA : Maingay K. D. 1261 !

*A. ? costalis*, Nees in Wall. Pl. As. Rar. II. 72 and Syst. Laur. 185; Hook. f. in Fl. Br. Ind. V. 146 seems to be *Litsea robusta*, Bl.

ALSEODAPHNE LUCIDA, Nees in Wall. Pl. As. Rar. II. 72 (1831). "Branches stout, lenticellate. *Leaves* 20—30 cm. long, scattered, very coriaceous, obovate-oblong, acuminate, base obtuse; shining above, paler beneath; nerves 16—20 pairs, spreading, slender; midrib prominent above; reticulations beneath very faint; petiole 2·5—4 cm. long, terete, thickened and rugose at the base." (Description from Fl. Br. Ind.). Syst. Laur. 186; Meissn. in DC. Prodr. XV. i. 29; Hook. f. Fl. Br. Ind. V. 147. *Laurus ? lucida*. Wall. Cat. 2590.

SINGAPORE : Wallich 2590 !

In the Fl. Br. Ind. it is suggested that this is not a Laurineous plant, but it seems not unlike a *Litsea*. The chief characteristic of the leaves is that the main nerves are at first straight and parallel and curve close to the margin.

#### 8. NOTHAPHOEBE, Blume.

Evergreen trees. *Leaves* alternate, not subverticillate but more or less crowded towards the ends of the branchlets, penni-nerved. *Flowers* very small, hermaphrodite, in axillary or subterminal panicles, the cymules of the branches generally subumbellate. *Perianth*-tube very short, continuous with the pedicel; lobes 6, unequal, the 3 outer usually much smaller than the inner. *Stamens* 9 fertile, with 4-celled ovate-oblong very small villous anthers and short filaments; those of the 1st row opposite the outer perianth-

lobes introrse; those of the 2nd row opposite the inner perianth-lobes, also introrse; those of the 3rd row opposite those of the 1st row, extrorse, with 2 small villous rounded glands at the base a little behind the glands sometimes wanting; staminodes of the 4th row opposite the stamens of the 2nd row, very small, ovate or triangular, villous on both sides. *Ovary* ovoid or globose, style slender, stigma peltate. *Fruit* an ellipsoid or oblong-obovoid berry seated on the enlarged perianth-tube and sometimes persistent lobes and supported by the slightly enlarged pedicel.—DISTRIB. Malay Islands and Peninsula, about 13 species.

Leaves mostly obovate or oblanceolate, cuneate at base, under 20 cm. long; glands of 3rd row stamens always present.

Leaves without very prominent raised reticulation; flower panicles under 12 cm. long.

Flower-panicles glabrous or only puberulous.

Leaves chartaceous, main nerves

6—8 pairs .. .. 1. *N. umbelliflora*.

Leaves membranous, main nerves

8—10 pairs .. .. 2. *N. fruticosa*.

Flower-panicles rusty-tomentose (exc. var.

*glabrescens*); leaves chartaceo-coriaceous 3. *N. Kingiana*.

Leaves with very prominent raised reticulation;

flower-panicles over 15 cm. long .. 4. *N. reticulata*.

Leaves panduriform-obovate, cordate-auriculate at base,

over 20 cm. long; glands of 3rd row stamens absent or exceedingly minute .. .. 5. *N. panduriformis*.

1. *NOTHAPHOEBE UMBELLIFLORA*, Blume in Mus. Bot. Lugd.-Bat. I. 328 (1850). An evergreen tree reaching 15 to 25 m. in height and a considerable girth; branchlets glabrous, slender, white, the uppermost black when dry, innovations rusty-tomentose; leaf-buds lanceolate, very small, rusty-tomentose, with few or no scales. *Leaves* chartaceous; elliptic, obovate or oblanceolate, cuspidate-acuminate at apex, long-cuneate at base rarely almost rounded but always somewhat decurrent; glabrous on both surfaces, the upper dark olive brown, the lower reddish; 8 to 20 cm. long, 3—6 cm. broad; midrib slender, prominent beneath; main nerves 6—8 pairs, sometimes rather more, rather oblique, curved to the margin where they are joined in loops, cross nervules few, irregular, prominent, raised; reticulation obscure; petiole 8—12 mm. long, often curved. *Flowers* minute, in axillary thyrsiform slender puberulous panicles shorter than the leaves and up to 10 cm. long; branches

many, ultimate cymules umbelliform; bracts ovate, tomentose; bracteoles minute; pedicel clavate, 1—2 mm. long; buds globose, about 1 mm. in diam., sub-glabrous; flowers reddish. *Perianth*-lobes very small, ovate; outer 3.5 to 3.75 mm. long, inner three 1—1.25 mm. long, slightly pubescent within. *Stamens* minute, villous with unicellular hairs, those of 1st and 2nd rows .75 mm. long, rounded at top; those of 3rd row similar but slightly larger, with 2 villous rounded glands a little behind them; staminodes of 4th row minute, ovate, densely villous. *Ovary* globose, 5 mm. in diam.; style as long; stigma small, peltate. *Fruit* an oblong obovoid dark purple berry about 4 cm. long and 2 cm. in diam., seated on the persistent perianth tube and lobes and the very slightly thickened pedicels; pericarp smooth, often spotted, rather thin. Meissn. in DC. Prodr. XV. i. 58; Koord. & Val. Bijdr. X. 105. *N. chartacea*, Bl. l.c. fide Koord. & Val. *Ocotea umbellifera*, Blume Bijdr. 573. *Phœbe*? *umbelliflora*, Nees Syst. Laur. 115; Miq. Fl. Ind. Bat. I. i. 911. *P. chartacea*, Miq. l.c. 912. *Haasia nitida*, Meissn. in DC. l.c. 61. *Alseodaphne umbelliflora*, Hook. f. in Fl. Br. Ind. V. 145.

SIAMESE STATES: Tongka, *Curtis* 2933!. PENANG: Batu Ferengy, Waterfall and other places, *Curtis* 1230!, 1536!, 2784!, 3068!. PERAK: in forest near Larut, Thaiping and Goping, *King's Collector* 3437!, 5897!, 6645!, 7490!, 8484!. MALACCA: *Griffith* K.D. 4253; *Maingay* K.D. 1247!, 1247-2!, 2515!; *Derry* 951!; at Selandan, *Goodenough* 1823!. SINGAPORE: at Chanchukang, &c., *Ridley* 1855!, 2888!, 3934!, 4576!, 6267!.—DISTRIB. Java, Sumatra, Borneo.

Vern. 'Medang Linggudi' (*Derry*); 'Kelah putih' (*Goodenough*).

*Curtis* 3665! from Waterfall, Penang, with oblanceolate glabrous leaves 20 cm. long and an ellipsoid drupe 3 cm. long, the leaves with about 13 pairs of main nerves, seems to belong to a species of *Nothaphœbe* near to *N. umbelliflora*, Blume.

2. *NOTHAPHÆBE FRUTICOSA*, Gamble in Kew Bull. 223 (1910). A shrub reaching 2—2.5 m. in height; branchlets slender, with greyish-white bark, uppermost black when dry; leaf-buds linear-lanceolate, black, glabrous, 5 mm. long. *Leaves* membranous, towards the ends of the branchlets but not crowded; lanceolate or oblanceolate, acuminate at apex, cuneate at base; both surfaces glabrous except the midrib above, olive-brown when dry; 10—15 cm. long, 3—5 cm. broad; midrib slender, slightly keeled above; main nerves 8—10 pairs, irregular, curving upwards and sometimes

branching, to meet in irregular loops well within the margin, scarcely raised above; transverse nervules few, inconspicuous but visible on the lower surface as are the reticulations; petiole slender, 5 to 15 mm. long. *Flowers* minute, 4 mm in diam., in very slender glabrous pedunculate panicles from the axils of upper leaves reaching 7 cm. in length and about 2 cm. in breadth; peduncles filiform as are the branches and pedicels, the latter clavate nearly 3 mm. long; buds globose. *Perianth*-tube very short; lobes ovate, the outer about 1 mm. long, the inner 1.5 mm., all very glandular and nearly glabrous without, puberulous within. *Stamens* of 1st and 2nd rows very small, clavate, villous, 1.5 mm. long; those of 3rd row rather longer with 2 villous rounded glands at the base; staminodes of 4th row ovate obtuse, villous. *Ovary* oblong; style very thick, curved; stigma large, peltate. *Fruit* not known.

PERAK: at Tapa, Wray 182!; at Ulu Bubong and Larut up to nearly 1000 m. alt., King's Collector 5448!, 11029! SELANGOR: at Ulu Selangor, Goodenough!

An obscure species much resembling in leaf *Alseodaphne peduncularis* and Wrayi, but with the flowers of *Nothaphæbe umbelliflora*.

3. *NOTHAPHÆBE KINGIANA*, Gamble in Kew Bull. 224 (1910). A tree, with spreading branches, reaching 12 to 18 m. in height and 40 to 50 cm. in diameter of stem; branchlets moderately stout, greyish-white, lenticellate; leaf-buds lanceolate, tawny pubescent, with few scales. *Leaves* chartaceo-coriaceous, variable in shape; elliptic or elliptic-obovate or -oblanceolate, obtusely acute to even sharply cuspidate acuminate at apex, cuneate attenuate or slightly rounded at base; upper surface shining, olive-green when dry, minutely punctulate, glabrous except on the midrib, lower reddish-brown glabrous; 10—25 cm. long, 5—9 cm. broad; midrib stout, raised on both surfaces; main nerves 8—11 pairs, starting at 50° to 60° with the midrib and curving to and along the margin, the upper ones joining in prominent loops, slightly impressed above, raised beneath, joined by rather irregular distant transverse nervules, which and the minor reticulations are prominent on both surfaces; petiole stout, 1—3 cm. long, the base often wrinkled, the upper part bordered by the decurrent margins of the blade. *Flowers* reddish or yellowish, small, in rusty-tomentose panicles from the upper leaf-axils, the panicles 10—12 cm. long and about 4 cm. broad; peduncle short; rhachis often flattened, branches short, ending in umbels of 3—6 flowers; bracts very small, ovate, caducous; bracteoles minute; pedicels

clavate, about 5 mm. long. *Perianth*-lobes densely rusty-tomentose without, thick, the 3 outer much shorter than the 3 inner, pubescent within. *Stamens* very small, those of the 1st and 2nd rows villous, scarcely 5 mm. long, filaments short, broad, connective obtuse; those of the 3rd row villous, about .75 mm. long, with 2 minute villous glands at the base; staminodes ovate, villous, very small and inconspicuous. *Ovary* oblong, attenuated into a slender style; stigma large, peltate. *Fruit* an obovoid oblong, often curved, berry 5—7 cm. long by 2 cm. broad, seated on the persistent perianth tube and lobes and somewhat enlarged rugose pedicel; pericarp dark red, spotted, smooth, rather thin, the apex wrinkled.

PERAK: at Waterfall, Thaipeng, etc. Wray 2268!, 2701!, 3452!; on low ground near Larut and up to about 800 m. alt., King's Collector 1928!, 3182!, 4938!, 6647!, 7295!.

Var. *glabrescens*, Gamble. *Panicles* very short, few-flowered, glabrous, the cymules not prominently subumbellate; glands at the base of the 3rd row stamens often absent. *Leaves* obovate or elliptic-oblong, acuminate at apex.

DINDINGS: at Lumut, Curtis 3445! (Herb. Singap. and Penang).

4. *NOTHAPHOEBE RETICULATA*, Gamble in Kew Bull. 224 (1910). A small tree reaching 12—15 m. in height and 15—25 cm. in diam.; branchlets moderately stout, pale brown; leaf-buds very small, rounded, pubescent. *Leaves* chartaceous; elliptic-obovate or oblanceolate, obtusely often cuspidately acuminate at apex, cuneate at base; both surfaces glabrous, prominently reticulate and pale olive-brown when dry; 12—22 cm. long, 4—8 cm. broad; midrib slender, slightly raised above, more so beneath; main nerves 8 to 12 pairs, starting at about 60° with the midrib and curving to and along the margin where they are connected, the lower by a series of small loops, the upper by larger ones, joined by a prominently reticulated network of nervules which are raised on both surfaces; petiole rather slender, 1.5—3 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* in spreading glabrous axillary or subterminal many-flowered panicles reaching 15—20 cm. in length; rhachis somewhat flattened; branches distant, often decurved, often 6 cm. long; cymules subumbellate; pedicels slender, clavate; flowers secund. *Perianth*-tube short; lobes ovate, acute, the outer 3 rather the smaller, 1.5—2 mm. long. *Stamens* small, those of 1st and 2nd rows clavate, 1.5 mm. long, the anthers elongate, filaments slen-



der and villous ; those of 3rd row similar but slightly longer and with 2 rounded villous glands ; staminodes of 4th row very small, lanceolate, villous as the other stamens with purplish-red hairs. *Ovary* ovoid, attenuated into a slender style ; stigma large, peltate. *Fruit* an ovoid or ellipsoid berry 4 cm. long by 2—3 cm. in diameter, seated on the enlarged rugose pedicel about 1 cm. long, the perianth-tube forming a flattened ring, the lobes apparently deciduous ; pericarp rather thick, dark-brown when dry, with prominent raised corky ferruginous pustules.

PERAK : *Scortechini* ! ; at Gunong Bubu, 1500 m. alt., *Wray* 3872 ! ; at cottage, *Ridley* 2967 ! ; in dense jungle on high mountains at 1000—1200 m. alt., *King's Collector* 7002 !.

5. *NOTHAPHŒBE PANDURIFORMIS*, Gamble. A tree, reaching about 12 m. in height and a considerable girth ; branchlets stout, grey, rough, striate ; leaf-buds short, lanceolate, puberulous. *Leaves* thinly coriaceous, more or less fasciated towards the ends of the branchlets, alternate ; obovate or panduriform, obtuse or bluntly apiculate at apex, cordate-auriculate at base ; glabrous on both surfaces, nearly black when dry on the upper, reddish brown on the lower ; 20—30 cm. long, 7—10 cm. broad, in old trees smaller and with fewer nerves ; midrib broad, stout, usually flat on the upper surface, raised on the lower ; main nerves 12 to 20 pairs, more numerous near the base, at first nearly straight, then curved to close to the margin where they meet in loops, joined by prominent parallel transverse nervules and the reticulation ; petiole very stout, 5—6 mm. long, sometimes 0. *Flowers* very small, yellow, in branching axillary rusty-pubescent panicles 10—20 cm. long and scaly at the base ; branches slender ; terminal cymules subumbellate, densely rusty-tomentose ; bracts and bracteoles triangular, acute, very small ; pedicels thick, about 2 mm. long ; buds globose. *Perianth*-tube very short ; outer 3 lobes triangular, 5 mm. long ; inner 3 ovate, half as long again. *Stamens* minute ; those of 1st and 2nd rows clavate, 5 mm. long, apex glabrous, filaments coppery-villous ; those of 3rd row longer, obtuse at tip, basal glands none or extremely minute ; staminodes of 4th row triangular, glabrous in front, villous behind. *Ovary* ovate ; style short, curved ; stigma peltate. *Fruit* an obovoid or cylindric-oblong curved berry 5—7 cm. long and 2—2.5 cm. in diam., seated on the remains of the perianth and a slightly enlarged pedicel, the apex wrinkled and depressed ; pericarp coriaceous, rather thin, smooth, dull red, when dry dark brown ; seed cylindric,



cotyledons conform to fruit, the apex depressed. *Alseodaphne panduriformis*, Hook. f. in Fl. Br. Ind. V. 145.

PERAK : *Scortechini* 1130!; at Chaukat Sardang and Simpang, Wray 742!, 2039!; at Ulu Bubong up 180 m. alt., King's Collector 7815!, 10019!, 10433!, 10655!. SELANGOR : at Labu river, Ridley 7624!. MALACCA : *Maingay* K.D. 1263!; at Panchor, Goodenough 1258!; at Brisu, Derry 950!. PAHANG : at Ayer Etam, Ridley 2413!; at Chenei river, Fox 5010!.

Vern. 'Poko Rengas' (Wray); 'Medang Kladi' (Goodenough).

#### 9. MACHILUS, Nees.

Evergreen trees; buds of the inflorescence with imbricate scales; leaf-buds lanceolate. *Leaves* alternate, penni-nerved, minutely reticulate. *Flowers* small or moderate-sized, hermaphrodite, in slender panicles, usually from the axils of upper leaves and appearing fascicled. *Perianth*-tube short or obsolete; lobes 6, subequal, or the outer slightly the smaller, persistent and reflexed or spreading in fruit. *Stamens* 9 perfect, with 4-celled anthers; those of the 1st row opposite the outer perianth-lobes, introrse, with long filaments and ovate or elliptic anther-cells; those of the 2nd row similar, introrse, opposite the inner perianth-lobes; those of the 3rd row opposite the 1st row stamens, extrorse, with oblong narrow anthers, slender filaments and a pair of stipitate glands at the base; staminodes of the 4th row cordate, stipitate, opposite the 2nd row stamens. *Ovary* sessile, narrowed into the style; stigma small or discoid. *Fruit* a globose or oblong berry, seated on the reflexed perianth which is hardly enlarged; fruiting pedicel not enlarged. —DISTRIB. About 25 species, all Asiatic, chiefly in north and north-east India and Burma, extending to China and Japan.

MACHILUS SCORTECHINII, Gamble in Kew Bull. 226 (1910). A tree, reaching 12 to 15 m. in height and 40 to 50 cm. in diameter of stem; branchlets dark brown, moderately stout, uppermost minutely tawny-puberulous as are the small lanceolate leaf-buds; scars of the inflorescence bud-scales prominent. *Leaves* chartaceous; obovate or obovate-oblong, shortly acute at apex, cuneate or attenuate at base; both surfaces dull, glabrous, olive-brown when dry; 10–20 cm. long, 4–7 cm. wide; midrib rather slender, channelled above, raised beneath; main nerves 8–10 pairs, slightly impressed above, raised beneath, at about 70° with the midrib,

curving to the margin, the upper ones joined in loops; transverse nervules irregular; reticulation prominently areolate under the lens; petiole slender, glabrous, 1—2 cm. long, channelled above. *Flowers* small, yellow, 6 mm. in diameter when open, in pedunculate grey-tawny pubescent axillary panicles reaching 10—20 cm. long; peduncles about one-third of the length of the panicle; branches spreading, dichotomous, subcorymbose, ending in 3-flowered dichasia; pedicels slender, 2—3 mm. long; buds globose. *Perianth*-tube very short; lobes subequal, ovate acute, densely tawny-tomentose without, sericeous within, 2—3 mm. long. *Stamens* slender; filaments silky-pubescent; those of 1st and 2nd rows 2 mm. long with ovate obtuse anthers; those of 3rd row as long, with oblong anthers and glabrous reniform stipitate glands; staminodes of 4th row cordate, villous-stipitate, 1 mm. long. *Ovary* oblong; style slender; stigma obtuse, small. *Fruit* not known.

PERAK: *Scortechini* 492!; an high mountains near Thaiping at 1000 to 1500 m. alt., *King's Collector* 8413!.

The fruit being unknown it is impossible to say for certain whether this species belong to *Phæbe* or *Machilus*; but it has more the habit of *Machilus* than of *Phæbe*.

#### 10. PHÆBE, Nees.

Evergreen trees or shrubs. *Leaves* alternate, often fascicled at the ends of the branchlets, penni-nerved (in Asiatic species); leaf-buds lanceolate or ovate, with few and usually spreading scales, sometimes with none. *Flowers* hermaphrodite or rarely polygamous, in pedunculate panicles from the upper leaf-axils as if fascicled, the branches dichasioid. *Perianth*-tube short; lobes 6 subequal, the outer 3 somewhat shorter than the inner, spreading at flowering, afterwards closing, erect and enlarged. Perfect *stamens* 9, with 4-celled ovate-oblong anthers; those of the 1st row opposite the outer perianth lobes, with elliptic introrse anthers, and slender filaments; those of the 2nd row similar and also introrse, opposite the inner perianth-lobes; those of the 3rd row opposite those of the 1st row but extrorse, often rather longer and more slender, bearing at or a little above their bases two large stipitate glabrous glands; staminodes of the 4th row opposite the 2nd row stamens, cordate or sagittate, stipitate, glabrous within. *Ovary* sessile, usually globose; style slender; stigma obtuse. *Fruit* an ovoid, ellipsoid or globose berry, seated on a cup formed of the enlarged erect persistent

perianth-lobes; cotyledons fleshy, the embryo conform to the fruit.—  
DISTRIB. Species about 20, in India and Malaya, with a further  
14 American.

Leaves lanceolate, glabrous or nearly so.

Leaves long-acuminate, main nerves 10—15 pairs;  
perianth glabrous; berry ovoid; filaments villous 1. *P. lanceolata*.

Leaves obtusely acuminate, main nerves 7—10  
pairs; perianth glabrous or slightly puberulous,  
berry globose; filaments glabrous .. 2. *P. declinata*.

Leaves obovate, hairy

Flowers rather large, 1 cm. broad when open.

Leaves chartaceous, cuneate at base; ferruginous-  
pubescent beneath; perianth densely ferruginous-  
tomentose .. .. 3. *P. macrophylla*.

Leaves coriaceous, rarely cuneate at base, glau-  
cescent and minutely puberulous beneath only;  
perianth greyish tomentose .. .. 4. *P. Kunstleri*.

Flowers small, under 6 mm. broad when open.

Leaves coriaceous, shortly cuneate or attenuate  
at base; perianth densely tawny-pubescent;  
panicles up to 25 cm. long .. .. 5. *P. opaca*.

Leaves thinly coriaceous, long cuneate at base;  
perianth grey-tomentose; panicles up to 10  
cm. long only .. .. 6. *P. cuneata*.

1. *PHOEBE LANCEOLATA*, Nees Syst. Laur. 109 (1836). A small evergreen tree; branchlets slender, with yellowish-white bark, young ones black when dry, villous, with persistent linear tawny-pubescent leafy scales; leaf-buds lanceolate with similar scales. *Leaves* chartaceo-coriaceous, usually clustered at the ends of the branchlets; lanceolate, long acuminate at apex, long cuneate at base; olive-brown and shining on the upper surface, pale brown on the lower, glabrous; 12—23 cm. long, 2—4 cm. broad; midrib slender, raised on both surfaces; main nerves 10 to 15 pairs, curving upwards to and along the margin, the upper ones joining in loops; transverse nervules and reticulation irregularly netted, prominent on the lower surface; petiole slender, 1—3 cm. long. *Flowers* in slender axillary glabrous subcorymbose panicles; peduncles slender, in flower about 5 cm. long, much longer in fruit; branches few, spreading, ending in dichasia; bracts linear, 5 mm. long, grey-puberulous; pedicels slender, clavate; buds obovoid, glabrous; flower pale yellow. *Perianth*-tube short; lobes ovate, subequal, 3 mm. long, villous within. *Stamens* of 1st and 2nd rows 1.5 mm. long, anthers oblong, obtuse, filaments and connective villous;

those of 3rd row rather large and with narrower anthers, furnished near the base behind with 2 reniform glabrous glands on short villous stalks or nearly sessile; staminodes of 4th row 1.25 mm. long, cordate, glabrous, villous-stipitate. *Ovary* globose; style slender; stigma peltate. *Fruit* an ovoid berry 12—13 mm. long, 7—8 mm. in diam., seated on the enlarged glabrous unequal erect perianth-lobes; pericarp smooth, black. Meissn. in DC. Prodr. XV. i. 34 (excl. var.  $\gamma$ .); Wight Ic. t. 1821; Brandis For. Fl. 377 and Ind. Trees, p. 532; Kurz For. Fl. II. 290; Hook. f. Fl. Br. Ind. V. 141; Prain Beng. Plants 900; Koord. & Val. Bijdr. X. 94; Ridley in Trans. Linn. Soc. 2nd Ser. III. 340 *Ocotea lanceolata*, Nees in Wall. Pl. As. Rar. II. 71. *Laurus lanceolata*, Wall. Cat. 2599. *L. lanceolaria*, Roxb. Fl. Ind. II. 309.

PAHANG: banks of Tahan river, Ridley 2272.—DISTRIB. India (subtropical Himalaya from the Sutlej eastwards), Burma, Java (Middle and East Java).

The description is taken entirely from Ridley's specimens which agree well in flower and fruit with the Indian ones, but have longer and narrower leaves with more numerous main nerves and more conspicuous reticulation.

2. *PHOEBE DECLINATA*, Nees Syst. Laur. 114 (1836). A tree; branchlets slender, grey, upper ones black when dry; leaf-buds small, lanceolate, slightly silky, without scales. *Leaves* chartaceous; lanceolate or elliptic-lanceolate, obtusely acuminate at apex, cuneate or attenuate at base; upper surface glabrous, shining, black-brown, lower reddish-brown or subglaucous, glabrous or very minutely puberulous; 7—12 cm. long, 2—4.5 cm. broad; midrib slender, impressed above; main nerves 7—10 pairs, very slender, obscure, curving upwards to and along the margin and joined by the minutely areolate reticulation; petiole slender, black, 1—2 cm. long, channelled above. *Flowers* in slender axillary black panicles, 8—12 cm. long; peduncles long, slender, terete; branches few, subcorymbose, ending in dichasia; pedicels slender, 2—5 mm. long, clavate; buds globose; flowers glabrous or slightly puberulous. *Perianth*-tube short; lobes ovate acute, subequal, the 3 outer slightly shorter, 2—3 mm. long, ciliate on the margins, silky within at the base. *Stamens* slender, 1 mm. long, glabrous except a tuft of silky hairs at the base; those of the 1st and 2nd rows with oblong anthers; those of the 3rd row with narrower anthers and two large stipitate glands at the base a little behind; staminodes of 4th row cordate-sagittate, silkily stipitate, 1 mm. long. *Ovary*

globose; style short; stigma capitate. *Fruit* a globose berry 7—10 mm. in diameter, seated on the short persistent scarcely enlarged perianth lobes and slightly enlarged pedicels; pericarp thin, black. Meissn. in DC. Prodr. XI. i. 34; Miq. Fl. Ind. Bat. I. i. 906; Hook. f. Fl. Br. Ind. V. 142; Koord. & Val. Bijdr. X. 95. *P. lanceolata*, var. *γ. ligustrina*, Meissn. l.c. *P. parviflora*, Bl. Mus. Bot. Lugd.-Bat. I. 327; Miq. l.c.; Meissn. l.c. *P. sumatrana*, Meissn. l.c. (*non* Miq. *fide* Koord. & Val.) *P. lamponga*, Miq. Fl. Ind. Bat. Suppl. 359. *Ocotea declinata*, Bl. Bijdr. 572. *O. ligustrina*, in part, Nees in Wall. Pl. As. Rar. II. 71 and III. 32. *Laurus declinata*, Bl. Cat. Hort. Buit. 66. *L. ligustrina*, Wall. Cat. 2588A. *Machilus* sp., Hook. f. Fl. Br. Ind. V. 862.

PENANG: at Penara Bukit, *Curtis* 942!, 1030!; at Balik Pulau, *Ridley* 9420!; Government Hill, *Fox* 47!. PERAK: in open jungle on hills at 250 to 400 m. alt., *King's Collector* 8748!. SELANGOR: at Ulu Selangor, *Goodenough* 10530!. SINGAPORE: *Wallich* 2588A; at Changi, *Ridley* 1811!, 4707!.—DISTRIB. Java (*Forbes* 594!), Sumatra.

Some of *Curtis'* specimens in Herb. Singap. have fruits with erect perianth-lobes and with reflexed perianth-lobes on the same shoot; apparently they are normally erect. The perianth-lobes are properly glabrous as described in the Fl. Br. Ind. but sometimes puberulous without as admitted by Koorders and Valetton. The following variety is only distinguishable by still greater silky pubescence.

var. *sericea*, Gamble. *Perianth*-lobes markedly silky villous without.

PERAK: on Haram Peak, *Scortechini* 554!

3. *PHOEBE MACROPHYLLA*, Blume in Mus. Bot. Lugd.-Bat. I. 326 (1851). An evergreen tree reaching 15 to 20 m. in height and 40 to 50 cm. in diameter of stem; branchlets stout, tuberculate, the upper parts with ferruginous tomentum, as are the thick conical leaf-buds with lanceolate scales. *Leaves* chartaceous; obovate or more rarely elliptic, shortly obtusely (occasionally acutely) apiculate at apex, cuneate or attenuate at base; upper surface shining, glabrous except on the midrib and main nerves, generally bullate, lower ferruginous-pubescent; margin recurved; 12—30 cm. long, 7—15 cm. broad; midrib very stout, impressed above as are the main nerves and transverse nervules, prominent beneath; main nerves 10 to 15 pairs, the lower ones very small and close together, curved outwards to and along the margin and joined, the lower by a series of small,

the upper by wide loops; transverse nervules many, prominent; reticulation irregularly areolate; petiole stout, very tomentose, 1.5—3 cm. long. *Flowers* rather large, greenish yellow, 1 cm. broad when open, closed after flowering, in long-peduncled densely ferruginous-tomentose panicles from the upper leaf-axils, reaching 25 cm. or longer and about 8 cm. in breadth; peduncles two-thirds of the length, tomentose even in fruit; branches spreading, corymbose, dichotomous, ending in 3-flowered dichasia; bracts and bracteoles lanceolate, caducous; pedicels short, clavate; buds globose. *Perianth*-tube short; lobes elliptic acute, the outer three slightly shorter than the inner which are 6—7 mm. long. *Stamens* large, the filaments and stalks of the glands and staminodes villous; those of 1st and 2nd rows 3 mm. long with elliptic emarginate anthers, those of 3rd row similar, but longer and oblong and narrow and with large stipitate glabrous reniform glands 1.5 mm. long; staminodes of 4th row cordate, acuminate, glabrous, with stalk 3 mm. long. *Ovary* globose, glabrous; style slender; stigma small, peltate when young. *Fruit* an ovoid-oblong berry 20 mm. long, 10 mm. in diameter, truncate at apex, seated on the enlarged puberulous perianth-lobes, nearly 10 mm. long; pericarp brown, shining, rather thin. *Miq. Fl. Ind. Bat. I. i. 908; Meissn. in DC. Prodr. XI. i. 38; Koord. & Val. Bijdr. X. 88. P. elliptica, Blume l.c. Persea macrophylla, Blume Bijdr. 568 in part. Machilus? macrophylla, Nees Syst. Laur. 674 in part.*

PERAK: at Waterloo, *Curtis* 2727!; *Scortechini* 1779!; hill forests about Larut up to 450 m. alt., *King's Collector* 3918!, 5607!, 5663!. SINGAPORE: at Bukit Mandai, *Ridley* 4581!, garden jungle, *Ridley* 3579!, 3891!, 13317!.

4. *PHOEBE KUNSTLERI*, Gamble in Kew Bull. 226 (1910). A large tree reaching 25 to 30 m. in height and 60 to 90 cm. in diameter of stem; branchlets stout, rugose, with prominent scars and oblong corky lenticels, uppermost tawny-puberulous; leaf-buds short, ovoid, tawny-pubescent. *Leaves* coriaceous; obovate or elliptic-obovate, obtuse or obtusely short apiculate at apex, attenuately narrowed at base for the lower half; upper surface shining, glabrous, lower glaucescent, minutely puberulous; margins slightly recurved; 12—24 cm. long, 6—11 cm. broad; midrib rather stout, impressed on the upper, raised on the lower surface; main nerves 8 to 12 pairs, impressed above, prominently raised beneath, curved to the margin where they meet in loops, joined by rather prominent distant trans-

verse nervules and an irregularly netted reticulation; petiole 1.5 to 4 cm. long, somewhat flattened above, puberulous. *Flowers* pale yellow, 10 mm. in diameter, in stout long-peduncled grey-tawny puberulous panicles from the axils of upper leaves, reaching about 20 cm. in length; peduncles 10—12 cm. long; branches 5 cm. long or less, dichotomous, subcorymbose, ending in pairs of flowers or 3-flowered dichasia; bracts caducous, triangular; pedicels slender, 5—6 mm. long; buds oblong, 5—7 mm. long. *Perianth*-tube short; lobes ovate acute, the outer 4 mm. long, the inner 5 mm., tomentose on both sides. *Stamens* slender, those of 1st and 2nd rows with elliptic anthers and long villous slender filaments 3 mm. long; those of the 3rd row 3.5 mm. long, the anthers oblong, truncate at apex, the two glands large, reniform, glabrous, attached a little above the base; staminodes of 4th series cordate, glabrous, villous behind and as the rather slender stipes, 2 mm. long. *Ovary* globose, minutely hirsute; style slender; stigma obtuse, slightly spreading. *Fruit* an ovoid berry 15 mm. long, 10 mm. in diam., truncate at apex, seated on the slightly spreading persistent glabrous perianth-lobes; pericarp bluish-green when fresh, nearly black and wrinkled when dry.

PERAK: in forests on hills near Goping up to 240 m. alt., *Kunstler* (*King's Collector*) 4491!, 6180!, 8173!; *Scortechini* 497!; at Blanda Mabok, *Wray* 3964!. SUNGAI UJONG: Herb. Singap. 2325 (Vern. 'Poko Medang Kusirai')!. SINGAPORE: at Pulau Ubri, *Ridley* 5915!.—DISTRIB. Borneo (*Haviland*!).

5. *PHOEBE OPACA*, Blume in Mus. Bot. Lugd.-Bat. I. 327 (1851). A tree reaching 20—25 m. in height and 40—50 cm. in diameter of stem; branches stout with whitish bark; branchlets thick, lenticellate, uppermost minutely puberulous; leaf-buds conical, 6—7 mm. long, densely tawny-puberulous, with leafy scales. *Leaves* coriaceous; obovate or oblanceolate or elliptic-obovate, shortly and obtusely acuminate at apex, cuneate or attenuate at base usually for some length; upper surface glabrous, shining, lower dull glaucescent, minutely puberulous, finally glabrous; 10—27 cm. long, 5—8 cm. broad; midrib stout, impressed above, raised beneath; main nerves 8 to 15 pairs, prominent beneath and often dark, variable in obliqueness, but all curving to and along the margin, joined by rather obscure parallel transverse nervules and an inconspicuous reticulation; petiole black, terete, 15—25 mm. long. *Flowers* 4—6 mm. broad when open, in spreading rusty-pubescent panicles from the axils of the uppermost leaves, appearing fascicled, reaching



25 cm. or more in length and 10 to 12 in breadth; peduncles about 12 cm. long; branches 2—3 cm. long, dichotomous, usually ending in 3-flowered dichasia; bracts lanceolate, leafy, early caducous; bracteoles similar but smaller; pedicels clavate; buds globose. *Perianth*-tube short; lobes elliptic, acute, 3—4 mm. long, the outer slightly shorter than the inner, densely tawny-pubescent. *Stamens* of 1st and 2nd rows with elliptic obtuse anthers 1.5 to 2 mm. long, and villous filaments; those of 3rd row oblong rather longer and with two large glabrous reniform stipitate glands near the base, back of connective, filaments and stalks of the glands villous; staminodes of 4th row cordate, apiculate, glabrous, on long villous stalks, 1 mm. in all. *Ovary* globose, glabrous or very slightly puberulous; style slender; stigma small. *Fruit* an ovoid berry, 15 mm. long, 10 mm. in diameter, depressed at apex, seated on the closely appressed persistent perianth-lobes, 5 mm. long and glabrous as is the fruiting rhachis of the panicle; pericarp smooth, shining, reticulate when dry. Miq. Fl. Ind. Bat. I. i. 909; Meissn. in DC. Prodr. XI. i. 36; Hook. f. Fl. Br. Ind. V. 143; Koord. & Val. Bijdr. X. 91. *P. attenuata*, Miq. in Pl. Jungh. 125. *P. densiflora*, Bl. l.c.; Miq. l.c.; Meissn. l.c. *P. javanica*, Meissn. l.c. 37. *P. malaccensis*, Meissn. l.c. 37. *P. lucida*, Bl. l.c.; Miq. l.c.; Meissn. l.c. *fide* Hook. f. *Alseodaphne? grandis*, Nees in Wall. Pl. As. Rar. II. 72 and Syst. Laur. 183; Meissn. l.c. 28. *Laurus grandis*, Wall. Cat. 2594A. *Persea grandis*, Nees in Wall. Pl. As. Rar. III. 32.

PENANG: Wallich 2594 A!. PERAK: hill forests near Perak, up to 450 m. alt., King's Collector 5980!, 8339!. MALACCA: Griffith K.D. 4255!; Maingay K.D. 1245!, 1246!; at Merliman, Goodenough 1620!; Holmberg 708!; Derry 922!; at Sadanun reserve, Derry 513!. JOHORE: at Kwala Sembrong, Lake and Kelsall 4013!?. SINGAPORE: at Pulau Ubu, Ridley 5915!—DISTRIB. Java, Sumatra, Borneo.

Var. *cuspidata*, Gamble. Leaves cuspidate-acuminate at apex, rather thin; *perianth*-lobes shorter, less pubescent.

PERAK: near Ulu Kerling at 150—250 m. alt., King's Collector 8538!.

6. *PHOEBE CUNEATA*, Blume in Mus. Bot. Lugd.-Bat. I. 908 (1851). A tree reaching 20 to 25 m. in height and 60—90 cm. in diameter of stem; branchlets stout, pale brown, with prominent scars and lenticels, uppermost tawny-pubescent. Leaves thinly coriaceous, more or less fascicled at the ends of the branchlets;

obovate or obovate-oblong, shortly acute or acuminate at apex, long-cuneate at base; upper surface shining, glabrous except at the midrib, lower tawny-puberulous especially at the nerves; margins slightly recurved; 10—25 cm. long, 4—8 cm. broad; midrib prominent, impressed above, raised beneath; main nerves 8—12 pairs, slightly impressed above, curving obliquely upwards to the margin, the upper ones joining in loops; transverse nervules prominent, subparallel; reticulation prominent under the lens; petiole 10—25 mm. long, densely tawny-tomentose. *Flowers* about 3—6 mm. broad when open, in long-peduncled greyish-tawny panicles from the uppermost leaf-axils, reaching 10 cm. in length in flower, much longer in fruit; branches few, spreading, ending in subcorymbose dichasia; pedicels 2—4 mm. long, clavate; buds globose; flowers yellowish. *Perianth*-tube short; lobes subequal, the outer 3 rather the shorter, ovate acute, about 3 mm. long, densely grey tomentose. *Stamens* of 1st and 2nd rows 1.5—2 mm. long, the anthers elliptic obtuse or emarginate, glabrous in fruit, the filaments villous; those of 3rd row rather longer and similar but the anthers narrower, oblong, the 2 basal glands large glabrous reniform villous-stipitate; staminodes of 3rd row cordate, 1.25 mm. long, villous-stipitate, *Ovary* rounded, glabrous; style slender; stigma small. *Fruit* an ovoid or ellipsoid berry reaching 20 mm. long and 12 mm. in diameter, truncate at apex, seated on the enlarged, puberulous, appressed or somewhat spreading perianth-lobes; pericarp bluish-green when fresh, pale and shining when dry, finally black. Miq. Fl. Ind. Bat. I. i. 908; Meissn. in DC. Prodr. XI. i. 36; Koord. & Val. Bijdr. X. 90. *P. multiflora*, Bl. l.c.; Miq. l.c.; Meissn. l.c. (fide Koord. & Val.). *Persea macrophylla* var. *cuneata*, Bl. Bijdr. 568. *Machilus macrophyllus* var. Nees Syst. Laur. 674.

PROVINCE WELLESLEY: at Kubong Ulu Reserve, *Curtis* 2425!. PERAK: Maxwell's Hill, *Ridley*!; in dense jungle near Larut up to 1300 m. alt., *King's Collector* 801!, 2646!, 6249!, 6577!, 6616!, 6995!, 10893!; at lower camp, Gunong Batu Pateh, over 1000 m. alt., *Wray* 1186!. SINGAPORE: at Changi, *Ridley* 4812!—DISTRIB. Java.

#### 11. STEMMATODAPHNE, Gamble.

Trees. *Leaves* alternate, membranous, crowded towards the ends of the branchlets; the nerves conspicuous. *Flowers* in umbels in lax panicles from the upper leaf-axils; pedicels very long and

conspicuous. *Perianth*-lobes 6, subequal, with a raised ring at their base inside. *Stamens* 9 fertile with 4-celled anthers; those of the first and second rows short triangular with no or very short broad filaments, introrse; those of the 3rd row similar but with extrorse or marginal anther-cells, and with two minute glands at the base, sometimes absent; staminodes of the 4th row triangular, sessile; the staminal ring detachable. *Ovary* usually globose; style short; stigma minute. *Fruit* a large globose berry; fruiting perianth persistent, the lobes erect or somewhat reflexed; the pedicel enlarged, clavate.—DISTRIB. One species.

STEMMATODAPHNE PERAKENSIS, Gamble in Kew Bull. 227 (1910). A tree with spreading branches reaching 10 to 12 m. in height and 30 to 45 cm. in diam. of stem; branchlets moderately stout, with greyish white bark; leaf-buds lanceolate, tawny-pubescent. *Leaves* membranous; obovate, long acuminate at apex, cuneate, attenuate or sometimes a little rounded at base; both surfaces glabrous, the upper nearly black when dry, often bullate, the lower dark brown; 12—30 cm. long, 6—12 cm. broad; midrib stout, flat or slightly impressed above, much raised beneath; main nerves 10 to 15 pairs, unequally distant, slightly impressed above, raised beneath, straight or slightly curved to near the margin, where the lower ones end in a series of small loops and the upper ones are joined by prominent large loops forming a continuous intramarginal nerve to the apex; transverse nervules parallel, slender, more or less impressed above, smaller reticulation not prominent; petiole variable in length, 1—5 cm. long, channelled above, glabrous. *Flowers* small, in lax slightly puberulous panicles from the upper leaf-axils, reaching 10—12 cm. in length and black when dry; peduncles slender, 3—7 cm. long; branches few, 1—1.5 cm. long, ending in 4—5-flowered umbels; pedicels conspicuous, red, clavate, minutely puberulous, 10—15 mm. long; buds globose. *Perianth*-lobes subequal, rounded, 1—2 mm. long, with a pubescent ring at their base within behind the stamens. *Stamens* triangular, with no or very short thick villous filaments, all 5—7 mm. long, those of 3rd row with very minute or no basal glands; staminodes of 4th row triangular acute, .6 mm. long, villous at base. *Ovary* ovoid-globose; style very short, conical; stigma minute. *Fruit* a large obovoid globose berry reaching 6 cm. in length and 4—5 cm. in diameter, seated on the persistent more or less reflexed perianth-lobes and the enlarged clavate warted pedicel 2—3 cm. long and 5—7 mm. broad at top; pericarp smooth.

PERAK: at Thaipeng, Wray 2658!; at Kwala Dipong, *Scortechini* 1793!; Ulu Bubong and Larut Hills up to 300 m. alt., *King's Collector* 3153!, 6703!, 10541!. MALACCA: at Batang Malacca, *Derry* 203!, 1157!. Vern. 'Medang Taying' (*Derry*), 'Meddang Katanah' (*Herb. Singap.* 920!), 'Medang Kuning' (*Herb. Singap.* 865!).

### Tribe VI. LITSEÆ.

#### 12. ACTINODAPHNE, Nees.

Evergreen trees or shrubs. *Leaves* subverticillate, rarely scattered or opposite, penni-nerved, sometimes 3-ribbed at base, leaf-buds with imbricate perulate scales. *Flowers* small, dicecious, in axillary or lateral dense bracteate sessile or peduncled clusters or short racemes bearing bracteate umbellules of usually 5; the bracts imbricate, caducous; the pedicels lengthening after the fall of the bracts. *Perianth*-tube short; lobes 6, sub-equal. *Stamens* in ♂ flowers 9; those of the 1st row 3, opposite the outer perianth-lobes; those of the 2nd row 3, opposite the inner, both without glands; those of the 3rd row opposite those of the 1st the filaments 2-glandular; anthers all oblong, introrse, 4-celled; filaments slender. *Staminodes* in ♀ flowers also 9, those of the 1st and 2nd rows spatulate or linear, eglandular, those of the 3rd row linear and biglandular. *Ovary* in ♀ flowers ovoid, attenuate into the style; stigma dilated; in ♂ flowers rudimentary and empty or obsolete. *Fruit* a berry resting on the enlarged hardened flat or concave perianth-tube, the perianth-lobes usually persistent. *Seed* with thin testa; cotyledons very thick, usually hemispheric.—*DISTRIB.* About 50 species, in India, the Malay Peninsula and Archipelago and eastwards to Japan.

I regret to say that I am not very well satisfied with the work done on this most difficult genus, and especially with the following analysis. Except in the first three species the material available has been meagre and characters difficult to obtain.

Leaves at least 10—20 cm. long by 4—12 cm. broad;  
drupe globose.

Leaves oblanceolate, coriaceous, fruiting perianth  
discoid.

Leaves in whorls of up to 12 or more, lower  
surface glabrous or nearly so; drupe 20—25  
mm. in diam. .. ..

1. *A. sesquipetalis*.

Leaves in whorls of 6 to 10, lower surface  
rusty-tomentose; drupe 10—13 mm. in diam.

2. *A. Maingayi*.

- Leaves obovate, chartaceous, lower surface puberulous, glaucous; drupe 10—12 mm. in diam.; fruiting perianth disciform .. .. 3. *A. glomerata*.
- Leaves lanceolate, chartaceous, lower surface glabrous, glaucous; fruiting perianth cup-shaped .. 4. *A. montana*.
- Leaves not reaching 10—20 cm. long by 4—12 cm. broad; drupe globose or ovoid; fruiting perianth usually cup-shaped.
- Leaves usually over 10 cm. in length, more or less lanceolate.
- Leaves coriaceous, glabrous, glaucous beneath; fruiting perianth flattened .. .. 5. *A. johorensis*.
- Leaves subcoriaceous, usually puberulous beneath, not glaucous; fruiting perianth cup-shaped .. .. 6. *A. malaccensis*.
- Leaves chartaceo-coriaceous, tawny-villous beneath; fruiting perianth cup-shaped, rugose .. 7. *A. Ridleyi*.
- Leaves usually under 10 cm. in length, at most under 12 cm. coriaceous.
- Leaves lanceolate or oblanceolate, acuminate at apex.
- Leaves glaucous or glaucescent beneath, puberulous only when young .. 8. *A. pruinosa*.
- Leaves greyish-tawny-pubescent at all times .. 9. *A. Hullettii*.
- Leaves elliptic oblong, obtuse at apex, glaucous beneath .. .. 10. *A. oleifolia*.
- Leaves elliptic-ovate or obovate, white-glaucous beneath.
- Leaves cuspidate-acuminate at apex .. 11. *A. cuspidata*.
- Leaves bluntly acute at apex .. 12. *A. fragilis*.

1. *ACTINODAPHNE SESQUIPEDALIS*, Hook. f. and Th. in Herb. Ind. Or.; Hook. f. in Fl. Br. Ind. V. 151 (1886). A large tree reaching 15 to 20 or more metres in height and 50 to 75 cm. in diameter of stem; branchlets very stout, light-tawny-pubescent, the uppermost silkily villous; verticil-nodes marked by the very prominent scars of fallen leaves and leaf-bud scales; terminal branch-buds very large with imbricate tawny-pubescent scales, the outer ones leaf-like reaching 5 cm. or more in length and 4 cm. in diam. *Leaves* coriaceous, in prominent whorls of 12 or more; oblanceolate, shortly acuminate at apex, cuneate at base; upper surface shining, smooth, lower subglaucous, silky-villous especially on the nerves, at length glabrous; 20—50 cm. long, 4—12 cm. broad; midrib stout, channelled above, strongly raised beneath and often very silky-villous; main nerves 15 to 20 pairs, at about 30° with the midrib, only slightly curved near the margin, raised on both surfaces; transverse nervules and reticulation inconspicuous; petiole very stout, tawny-villous, 1—2 cm. long. *Flowers* in dense clusters 1 to 3 cm. in diameter on

the branchlets between the upper verticils and supported by orbicular concave deciduous bracts; clusters bearing a number of shortly peduncled involucre each of 4 orbicular concave deciduous bracts and enclosing an umbellule of 5 flowers, the centre one longer peduncled (5 mm.) than the 4 outer (2 mm.); ♂ and ♀ flowers similar with short perianth-tubes and 6 subequal concave perianth-lobes, pubescent without, glabrous within, 5-nerved and prominently gland-dotted at length recurved. *Stamens* of ♂ flowers in 2 rows, those of the 2 outer rows eglandular, those of the inner row with a pair of long sessile glabrous glands; anthers oblong 1.5—2 mm. long, glabrous; filaments as long as anthers with a thick tuft of golden-tawny unicellular hairs. *Staminodes* of ♀ flowers oblong or lanceolate, glabrous, the inner row biglandular. *Ovary* short, villous, that of ♂ flowers rudimentary or 0, that of ♀ flowers ovoid; style thick, curved; stigma peltate, large, crenately 3—4-lobed. *Fruit* globose, orange when ripe, smooth, shining, 20—25 mm. in diam. seated on the enlarged thickened rugose perianth which is cup-shaped when young, at length disciform, 10—15 mm. in diam.; pericarp thick, fleshy, shining. *Litsæa macrophylla*, Kurz For. Fl. II. 305 not of Blume. *Myristica sesquipedalis*, Wall. Cat. 6809.

PENANG: *Wallich* 6809!; at Waterfall and Pulau Boetong, *Curtis* 2304!, 2473!. PERAK: at Maxwell's Hill, 4000 ft., *Curtis* 2053!; *Scortechini* 209!; at Relan Tujor, *Wray* 4225!; Goping, Larut, etc., up to 1000 ft., *King's Collector* 4399!, 5008!, 5147!, 6435!, 7202!.—DISTRIB. Tenasserim, at Mergui, *Griffith* 4327!

2. ACTINODAPHNE MAINGAYI, Hook. f. in Fl. Br. Ind. V. 151 (1886). A large tree reaching 15 to 20 m. or more in height and a considerable diameter of stem; branchlets very stout, dark tawny-pubescent, the uppermost and innovations densely villous with brown hairs, verticil-nodes marked by the prominent scars of fallen leaves and leaf-bud scales; terminal branch-buds oblong with imbricate scales, the outer ones leaf-like reaching 1 to 2 cm. in length and densely tawny-pubescent. *Leaves* coriaceous, in whorls of about 6 to 10; oblanceolate or elliptic-oblong or oblong-obovate, shortly acuminate at apex, cuneate or attenuate at base; upper surface shining, glabrous except the nerves, lower rusty-tomentose especially on the nerves, younger ones subglaucous between them; 15 to 40 cm. long, 5—12 cm. broad; midrib stout, slightly raised, flattened and tomentose above, much raised beneath; main nerves 10 to 20 pairs at about 40° to 50° with the midrib, curved upwards to the



margin, impressed above and pubescent, strongly raised, beneath; transverse nervules very prominent, subparallel, much raised beneath, slightly depressed above, joined by a prominent reticulation; petiole very stout, rusty-tomentose, 2 to 4 cm. long. *Flowers* in dense clusters about 2 cm. in diam. on the internodes between the upper verticils and supported by orbicular concave bracts glabrous within; clusters bearing many stoutly-peduncled involucre each of 4 orbicular concave bracts enclosing an umbellule of 5 flowers, the centre one longer peduncled than the 4 outer; ♂ and ♀ flowers similar with 6 subequal ovate concave perianth-lobes, tomentose without, glabrous within, 5—7 nerved, prominently gland-dotted, at length recurved, 4—5 mm. long. *Stamens* of ♂ flowers in 3 rows, the inner row with a pair of large rugose glabrous glands a little above the base of the filaments; anthers elliptic-oblong, 2 mm. long, glabrous; filaments rather longer with a tuft of tawny-brown hairs at their bases. *Stamens* of ♀ flowers reduced to lanceolate glabrous staminodes. *Ovary*, style and stigma of ♀ flowers not seen, in ♂ flowers 0. *Fruit* globose, bright yellow when ripe, smooth, 10—13 mm. in diam., seated on the flat, enlarged, 6-lobed perianth 10 mm. in diameter and villous beneath, the lobes reflexed; pericarp thick, fleshy; pedicels little enlarged, 3 mm. long, villous.

PERAK: at lower camp, Gunong Batu Pateh, at 1000 m. alt. *Wray* 915!, at Tapah *Wray* 1333!; at Gopong on low ground up to 150 m., *King's Collector* 6172!. MALACCA: *Maingay* K.D. 1258!, 1275!. SINGAPORE: at Pulau Ubin, *Ridley* 9489!, at Bukit Timah *Ridley*!

Kunstler says: "this is a very fine-looking tree" and indeed it must be.

Var. *macrocarpa*, Gamble. *Leaves* only slightly pubescent beneath and more glaucous; *fruit* depressed-globose 2—2.5 cm. in diameter.

PERAK: at lower camp, Gunong Batu Pateh, 1000 m. alt. *Wray* 1230! (a bush); in dense jungle on high mountains, Larut, 900—1200 m., *King's Collector* 6435! (a small tree 20 to 25 ft. high). PAHANG: at Telan, *Ridley* 13783!—DISTRIB. Borneo, at Matang, *Ridley* 11675!?

Var. *elliptica*, Gamble. *Leaves* elliptic, acuminate at apex, rounded attenuate at base, glaucous and pubescent beneath, 20—25 cm. long, 10—12 cm. broad; young fruit in pedunculate cymes about 3 cm. long.

PERAK: at lower camp, Gunong Batu Pateh, *Wray* 1226!.



3. *ACTINODAPHNE GLOMERATA*, Nees Syst. Laur. 597 (1836). A spreading tree reaching 10 to 12 m. in height and 30 to 45 cm. in diam. of stem; branchlets fairly stout, striate, shortly rusty-puberulous, ultimately glabrescent; verticil-nodes scarred; innovations densely silky pubescent; terminal branch-buds with the outer scales leaf-like 2—3 cm. long and the inner ones persistent at intervals on the internodes very silky and about 15 mm. long. *Leaves* chartaceous, in whorls of 4 to 7; obovate, abruptly acuminate at apex, acute or cuneate at base; upper surface glabrous except on the nerves, scarcely shining, lower pale grey to glaucous, minutely velvety puberulous, rusty-pubescent on the nerves; 10—30 cm. long, 6—12 cm. broad; midrib moderately stout, rusty pubescent, slightly raised on the upper, more so on the lower surface; main nerves 8 to 12 pairs at about 50° with the midrib, at first straight, then curved to and along the margin, raised on both surfaces; transverse nervules many, subparallel, prominent beneath, other reticulations scarcely visible; petiole pubescent, 2—2.5 cm. long. *Flowers* yellowish, in clusters of rather long-pedunculate rusty-pubescent cymes on the branchlets between the upper verticils or axillary at those verticils supported by orbicular concave deciduous bracts; cyme-peduncles slender, up to 2 cm. long, bearing umbellules of 5 flowers or less, supported by an involucre of 4 boat-shaped ovate bracts up to 1 cm. long; pedicels slender, those of the central flower longest at first, afterwards all subequal, 5 mm. long; perianth-tube very small or none; lobes ovate, glabrous within, 3—4 mm. long, 3—5-nerved. *Stamens* of ♂ flowers in 3 rows, those of the 1st and 2nd rows eglandular, 4 mm. long, with oblong obtuse anthers and slender filaments bearing a tuft of tawny hairs at the base; those of the 3rd row as long but with more rounded anthers, and the filaments bearing tufts of tawny hairs and halfway from the base two large glabrous ovoid glands; pistil of ♀ flowers none. *Staminodes* of ♀ flowers, ovary, style and stigma not seen. *Fruit* depressed-globose, up to 12 mm. in breadth and 10 mm. high, shortly apiculate, in compound umbels with thickened peduncles, seated on the flattened disciform enlarged perianth not lobed at the margins and about 6 mm. in diam.; pericarp thick, smooth, apparently yellow; cotyledons hemispheric. Blume in Mus. Bot. Lugd.-Bat. I. 343; Miq. Fl. Ind. Bat. I. i. 968; Meissn. in DC. Prodr. XV. i. 215; Koord. & Val. Bijdr. X. 114. *Litsæa glomerata*, Bl. Bijdr. 566; Nees in Wall. Pl. As. Rar. II. 65. *Laurus glomerata*, Bl. Cat. Hort. Buit. 66.

PERAK: in open jungle on marshy ground under 100 m. alt., *King's Collector* 4192!. SINGAPORE: at Bukit Tima, Bukit Mandai and Bukit Panyang, *Ridley* 6296!, 6741!, 12529!.—DISTRIB. Java (*Forbes* 526!), Sumatra.

4. *ACTINODAPHNE MONTANA*, Gamble in Kew Bull. 312 (1910). A tree reaching 15 to 20 m. in height and 30—45 cm. in diam. of stem; branchlets dark brown, glabrous, striate; shoot-budscylindroconical, 1 cm. or more long, perulate, the scales ovate, rusty-villous, with recurved tips. *Leaves* chartaceous, in whorls of 4—5, the nodes thickened; lanceolate or oblanceolate, long acuminate at apex, acuminate at base; both surfaces glabrous, the upper brown when dry, paler near the nerves, the lower bluish-green beneath, grey-glaucous when dry; 15—25 cm. long, 4—8 cm. broad; midrib prominent, raised on both surfaces; main nerves 8—10 pairs, very oblique, at about 30° with the midrib, gently curving to join in serial loops near the margin; transverse nervules prominent, usually arched, enclosing the netted reticulation; petiole rather slender, 1—3 cm. long, channelled. *Flowers* in umbellules in pubescent racemes about 2 cm. long from the internodes between the whorls, the flowers themselves not known. Young *fruit* (mature not known) enclosed in the cup-shaped enlarged perianth-tube, puberulous without, villous within, the cup as long as the rather slender enlarged pedicels.

PERAK: in open forest on mountain tops near Larut at 900—1100 m. alt., *King's Collector* 2129!, 2913!.

This species comes very near to *A. angustifolia*, Nees, but differs in having the nerves of the leaves not raised and in a much longer cup to the fruiting perianth-tube. When the flowers and ripe fruit are obtained it may be possible to say if it is not a variety only.

5. *ACTINODAPHNE JOHORENSIS*, Gamble in Kew Bull. 313 (1910). A tree?, branchlets terete, greyish-brown, glabrous, uppermost slightly rufous-villous; buds small, villous. *Leaves* coriaceous, in whorls of 3—5; narrowly lanceolate, obtuse at apex, long-cuneate at base; glabrous on both surfaces, the upper shining, olive-green when dry, the lower glaucous-grey; 12—16 cm. long, 3—5 cm. broad; midrib slender, raised on both surfaces; main nerves distant, 6—7 pairs, oblique, raised on the upper surface, joining in loops near the margin; secondary nerves few; transverse nervules very faint on the upper surface; reticulation minutely areolate, almost invisible; petiole 2—3 cm. long, channelled. *Flowers* in apparently sessile

umbellules on the internodes between the leaf-whorls, otherwise not known. *Fruit* a globose drupe 12 mm. in diam., seated on the flattened lobed enlarged perianth-tube 7 mm. in diam.; fruiting pedicel thick, 8 mm. long; pericarp dull black when dry.

JOHORE: at Gunong Panti, 300 m. alt., *Ridley* 4419!—DISTRIB. Lingya.

6. *ACTINODAPHNE MALACCENSIS*, Hook. f. in Fl. Br. Ind. V. 148 (1886). A tree; branchlets rather stout, densely rusty-tomentose; terminal branch-buds lanceolate, the outer scales leaf-like, up to 1 cm. long. *Leaves* subcoriaceous, in whorls of 4 to 7; elliptic-oblong or -lanceolate, obtusely acuminate at apex, attenuate at base; upper surface shining, glabrous, lower puberulous when young, glabrous when old except sometimes on the nerves; 10—20 cm. long, 4—7 cm. broad; midrib rather slender, raised on the upper surface; main nerves 8—12 pairs, often rather irregular and branched, impressed above, conspicuous beneath; transverse nervules few, irregular; reticulation obscure; petiole rusty-tomentose, 1—2 cm. long. *Flowers* in globose clusters 7—13 mm. in diam. at the verticils or on the internodes between them, supported by small orbicular deciduous bracts; clusters with many sessile involucre each of 4 orbicular concave bracts 2—3 mm. long, pubescent without glabrous within and 1—3-nerved; each involucre bearing an umbellule of 3 flowers, the middle one longer pedicellate than the side ones; ♂ and ♀ flowers similar, with 6 ovate ciliate perianth-lobes 2 mm. long, puberulous without, glabrous within. *Stamens* of ♂ flowers in 3 rows, 1.5 mm. long, the anthers ovate, the filaments hidden in tufts of tawny-silky hairs, those of the inner row with 2 large nearly basal reniform glabrous glands; rudimentary ovary conical. *Staminodes* of ♀ flowers also in 3 rows, those of the 2 outer rows clavate, those of the third row hastate with two large glabrous glands on the filaments; filaments always with tufts of silky hair. Ovary sub-globose; style short, slender; stigma broadly peltate. *Fruit* 'globose, 8 mm. in diameter, seated on the very small cup-shaped thickened perianth-tube 3 mm. in diam.; pedicel very short and thick' (Hooker).

MALACCA: *Maingay* K.D. 1259!; *Hullett* 647!. SINGAPORE: in garden jungle, *Ridley* 9123!

7. *ACTINODAPHNE RIDLEYI*, Gamble in Kew Bull. 312 (1910). A tree?; branchlets terete, cylindric, uppermost rusty-pubescent; buds

small. *Leaves* chartaceo-coriaceous, in whorls of 4 to 6; lanceolate, acuminate and mucronate at apex, acuminate at base; upper surface shining, glabrous, areolate, lower tawny-villous, pubescent on the midrib and nerves; margins somewhat recurved; 10—16 cm. long, 3—5 cm. broad; midrib slender, raised on both surfaces; main nerves 6—8 pairs, curving upwards to join in small loops near the margin; transverse nervules straight, obscure as is the reticulation, which under the lens seems punctate on the upper surface; petiole moderately stout, rusty-pubescent, 1—2 cm. long. *Flowers* in sessile axillary or lateral umbellules supported by chaffy deciduous scales; involucre bracts orbicular, deciduous; flowers about 4 in each umbellule; perianth-tube 2.5 mm. long; perianth-lobes obovate, obtuse, 3.5 mm. long, densely villous without, glabrous within. *Stamens* of ♂ flowers unknown. *Staminodes* of ♀ flowers 9, those of the outer two rows linear-clavate 1.5 mm. long, the filaments villous, those of the 3rd row similar but with a pair of large subreniform glabrous glands a little above the base. *Ovary* obovoid, hirsute on top; style slender, curved; stigma small, 3-lobed. *Fruit* a globose drupe nearly 1 cm. in diam., seated on the enlarged rugose cup-shaped perianth-tube which is surmounted by the persistent lobes and staminodes; pericarp shining, glabrous.

JOHORE: at Gunong Pulai, *Ridley* 12165!—DISTRIB. Borneo (*Haviland*).

S. ACTINODAPHNE PRUINOSA, Nees in Wall. Pl. As. Rar. II. 68 (1831), III. 31 (1832) and Syst. Laur. 591. A tree; branchlets slender, pale brown, uppermost rusty-tomentose; terminal buds lanceolate 1—1.5 cm. long, with many acuminate glabrous chaffy imbricate scales. *Leaves* coriaceous, in whorls of 4 to 6; lanceolate elliptic-lanceolate or oblanceolate, acuminate often caudately at apex, cuneate at base; upper surface shining, smooth, lower glaucous or glaucescent, finely puberulous when young; 7—12 cm. long, 3—5 cm. broad; midrib red, slender, raised on both surfaces; main nerves 8 to 10 pairs, slender, rather irregular, curved to and along the margin, slightly impressed on the upper surface, raised beneath; reticulation obscure; petiole slender, 7—13 mm. long. *Flowers* sessile or peduncled in fascicles on the internodes between the verticils or at the verticils themselves, supported by orbicular basal bracts; ♂ in globose heads up to 1 cm. in diam., when in bud in shortly-peduncled umbellules supported by 4 concave early caducous hispid bracts, the outer ones keeled and 4 mm. long; umbel-

lules of 3 (or 5, two being rudimentary) flowers, the central one pedicelled, the side ones sessile at first but afterwards pedicelled, each flower with 6 orbicular ciliate perianth-lobes glabrous within afterwards reflexed; ♀ in tawny-pubescent cymes 1 cm. long, the cymes branching and bearing similar bracteate umbellules of 3—5 flowers, flowers with a shortly campanulate perianth-tube, tawny-villous within, and 6 ovate reflexed perianth lobes 1.5 to 2 mm. long. *Stamens* of ♂ flowers in 3 rows, those of 2 outer rows oblong-ovate with slender villous filaments, those of 3rd row similar but with two large glabrous glands on the filaments; staminodes of ♀ flowers small, those of two outer rows slender oblong with villous filaments, those of 3rd row hastate with a pair of large glands at the base. *Ovary* ovoid; style curved, slender; stigma peltate; ovary of ♂ flowers similar but very small. *Fruit* a globose drupe, 5—7 mm. in diam., seated on the cupular, turbinate, enlarged perianth-tube about 6 mm. in diam., lobes deciduous leaving a waving margin; pericarp smooth; enlarged pedicel clavate, up to 7 mm. long, Meissn. in DC. Prodr. XV. 1. 216; Hook. f. in Fl. Br. Ind. V. 152; Miq. Fl. Ind. Bat. I. i. 967. *Laurus pruinosa*, Wall. Cat. 2584 A. B.

PENANG: *Wallich* 2584 B!; at Moniot's road, 1200 ft. (both ♂ and ♀) *Curtis* 1020!. SINGAPORE: *Maingay*, K.D. 1253!; at Changi, *Ridley* 2768! (leaves rather larger and less glaucous than type and fruiting pedicels longer).

Var. *Kunstleri*, Gamble. Upper branchlets less pubescent. Leaves less acuminate at apex, more so at base. *Drupe* globose, up to 1 cm. in diam., seated on a smaller more thickened turbinate cupule 6 mm. in diam. at mouth; pedicels shorter, less clavate.

PERAK: dense jungle on low ground near Larut at 90—150 m. alt., *King's Collector* 6063!.

9. *ACTINODAPHNE HULLETTII*, Gamble in Kew Bull. 314 (1910). A tree; branchlets rather slender, dark greyish-brown, uppermost closely tawny-pubescent. Leaves coriaceous, in whorls of 3 to 5; oblanceolate, acuminate at apex, cuneate at base; upper surface shining, glabrous except on the midrib, lower softly and closely greyish-tawny-pubescent; 7—11 cm. long, 2—3 cm. broad; midrib slender, raised on both surfaces, tawny-pubescent, branching into 5—6 pairs of very oblique (20°—30°) main nerves which often again branch; transverse nervules few, only apparent in very old leaves; reticulation not visible: petiole 5—10 mm. long, tawny-pubescent. *Flowers*

in bracteate axillary or lateral clusters, the bracts deciduous leaving a thick very short peduncle; ♂ flowers on pedicels 2—3 mm. long; perianth-tube short, villous; perianth-lobes ovate, ciliate, pubescent without, glabrous within, 2.5 mm. long. *Stamens* 9, those of the 1st and 2nd rows shortly oblong on short villous filaments, those of the 3rd row rather shorter and with each a pair of large reniform glands; rudimentary ovary ovoid, with short style; staminodes of ♀ flowers not known, nor fruit.

SINGAPORE: in Botanic Garden (wild ?) *Hullett* 659!—also sheet in Herb. Kew with number 38=2 'from botanic garden'!

10. *ACTINODAPHNE OLEIFOLIA*, Gamble in Kew Bull. 313 (1910), A shrub or small tree, scarcely 2—3 m. high; branchlets slender. terete, pale greyish-brown, uppermost densely and softly ferruginous-villous as are the leaf-buds and inflorescence. *Leaves* coriaceous, in whorls of 4—8; elliptic-oblong or -lanceolate, very obtusely attenuate at apex, shortly attenuate at base; upper surface shining or rather dull, prominently areolately pitted, lower surface paler or glaucous, both surfaces glabrous; 5—11 cm. long, 2—3 cm. broad; midrib stout, prominent, reddish; main nerves 8—10 or more, prominent and raised above, at about 70° with the midrib, curved upwards to anastomose near the margin; secondary nerves many; transverse nervules arched, reticulation areolately netted; petiole red, slender, 1—2 cm. long, slightly twisted. *Flowers* in dense tawny-villous cymose clusters of umbellules in the axils of the verticils or on the internodes between them, supported by orbicular concave deciduous bracts; umbellules usually of 5 flowers, the centre one the longest, surrounded by 5—6 concave imbricate involucre bracts; in ♂ flowers umbels 1 to about 3, in ♀ flowers apparently only 1; perianth-lobes ovate, densely villous without, glabrous within, 2—3-nerved, the inner 3 slightly the smaller and narrower, 2—3 mm. long. *Stamens* of ♂ flowers in 3 rows, the inner row with 2 large reniform sessile glands, filaments villous with golden-tawny hairs; staminodes of ♀ flowers also in 3 rows, the outer 2 rows spatulate, the inner hastate with 2 large glabrous glands. *Ovary* in ♂ flower without ovules; style slender; stigma capitate, lobed. *Fruit* ovoid-oblong, 7—12 mm. long, 4—7 mm. broad, the base supported by the cup-shaped enlarged perianth-tube which is surmounted by the persistent perianth-lobes and 5—7 mm. broad at top; pedicels thickened, 5 mm. long, tawny-villous; pericarp smooth, surmounted by the persistent style.



PERAK: at Gunong Batu Pateh, 1400 m. alt., *Wray* 280!, at Gunong Inas, 1500 m., *Wray* 4111!; in open jungle on top of Gunong Batu 1500—1600 m., *King's Collector* 7347!; at 1500 m., *Scortechini* 350!. PAHANG: at Gunong Berimbu, *Ridley* 13728!; at Kluang Terbang *W. D. Barnes*!—DISTRIB. Borneo (near Kuching, Sarawak, *Haviland* and *Hose* 334!)

This species greatly resembles *A. stenophylla*, Thwaites, a Ceylon species; but differs in the shorter peduncles and the fruit, and especially in the fruiting perianth-tube which has persistent lobes and is more cup-shaped, while in *A. stenophylla* the lobes are deciduous and the tube shallow. *A. stenophylla* also has the midrib of the leaves tawny-villous, while the under-surface in *A. oleifolia* is quite glabrous. The Borneo specimens have rather larger leaves reaching 4—5 cm. in breadth and much less prominently areolate, but otherwise agree.

11. *ACTINODAPHNE CUSPIDATA*, Gamble in Kew Bull. 314 (1910). A tree reaching 12 to 18 m. in height and 20—30 cm. in diam. of stem; branchlets rather thick with greyish or yellowish bark, uppermost rusty-pubescent; shoot-buds perulate, the scales ovate or lanceolate, acuminate. *Leaves* coriaceous, in whorls of about 4; elliptic or elliptic-obovate, long cuspidate-acuminate at apex with a very sharp acumen, attenuate at base; upper surface glabrous, shining, lower glaucous-white with scattered black hairs, the midrib and nerves rusty pubescent; 8—12 cm. long, 4—5 cm. broad; midrib prominent, raised on both surfaces; main nerves 8—10 pairs, irregular, curving upwards to join in loops near the margin; transverse nervules nearly horizontal, enclosing the rather minute reticulation; petiole slender, rusty-pubescent, 1 cm. long. *Flowers* in umbellules in very short rusty-pubescent racemes under 1 cm. long, subterminal or lateral from the internodes between the whorls, supported at the base by chestnut-brown hard ovate acuminate caducous scales; peduncles very short; involucre bracts 4, broadly ovate, enclosing the umbellule of 4 flowers; perianth lobes ovate, obtuse, ciliate, gland-dotted, 2—5 mm. long. *Stamens* of ♂ flowers 9, those of the 1st and 2nd rows 2 mm. long, with oblong anthers and slender villous filaments, those of the 3rd row shorter with a pair of large glabrous, sessile or very shortly stipitate, glands at the base, rudimentary ovary very small; style slender; stigma capitate. *Fruit* and ♀ flowers not known.

PERAK: in dense jungle on hills at 150—250 m. alt. near Ulu Bera, *King's Collector* 10797!



11. *ACTINODAPHNE FRAGILIS*, Gamble in Kew Bull. 315 (1910). A tree reaching 12—18 m. in height and up to 60 cm. in diam. of stem; branchlets rather slender, dark greyish-brown, with longitudinal cracks, glabrous, the ultimate ones minutely puberulous. *Leaves* coriaceous, in whorls of 2—4; ovate or elliptic-ovate, bluntly-acute at apex, acute at base; glabrous on both surfaces, the upper pale brown when dry, the lower white-glaucous; 5—12 cm. long, 2—5 cm. broad; midrib slender, raised on both surfaces; main nerves 5—6 pairs, the lowest pair subopposite, curving to the margin and then joining in loops; transverse nervules and areolate reticulation obscure; petiole slender, 1—2 cm. long, channelled. *Flowers* in umbellules in slender rusty-puberulous pedunculate umbels up to 1 cm. long, lateral on the internodes between the leaves of the uppermost branchlets, the joints easily breaking, glabrous in fruit; involucre bracts very early deciduous; pedicels slender, 2 mm. long; perianth-tube short, with a ring of golden-villous hairs at the mouth within; lobes ovate, ciliate, glabrous within, 1 mm. long. *Stamens* of ♂ flowers not known. *Staminodes* of ♀ flowers very small, clavate, the filaments villous at base, those of the 3rd row with a pair of orbicular glabrous glands. *Ovary* globose; style slender; stigma large, capitate. *Fruit* an ovoid drupe nearly 1 cm. long, 7—8 mm. in diam., seated on the patelliform enlarged perianth-tube 5—6 mm. in diam., its margin entire; pericarp smooth, shining; enlarged pedicel 7 mm. long.

PERAK: in open jungle on tops of hills, Ulu Bubong, 180—280 m. alt., King's Collector 10743!, 10904!

13. *LITSEA*, Lamk.

Evergreen or rarely deciduous trees or shrubs; leaf-buds usually without scales. *Leaves* alternate or sometimes opposite or subopposite, penni-nerved. *Flowers* dioecious, in sessile or more usually pedunculate umbellules of several flowers, varying from 2 to 15 but usually 4 to 6, supported by 4 to 6 or rarely more involucre bracts, the outer ones at any rate orbicular concave; umbellules in axillary or lateral (i.e. above leaf-scales or on branches or on the trunk) racemes varying from under 1 cm. long to about 20 cm., the raceme bracts very caducous; flower-pedicels short, sometimes 0; perianth-tube in ♂ flowers 0 or very small, in ♀ flowers funnel-shaped, lobes normally 6 often more sometimes wanting in whole or part, equal or

unequal. *Stamens* in ♂ flowers normally 9 or 12, sometimes more, rarely less (in one species 6), in four rows, those of the two outer rows with eglandular or occasionally 1—2-glandular filaments, those of the 3rd row with biglandular filaments, as are those of the 4th row when present, all the stamens with 4 cells, two cells introrse or the lower pair lateral; ovary 0 or rudimentary with rudimentary style and stigma, very rarely 1-ovuled. *Staminodes* in ♀ flowers normally 9 or 12, etc., as in ♂, those of the outer 2 rows usually clavate or spatulate, those of the inner rows usually shorter subulate or clavate with a pair of glands at their bases; ovary enclosed in the perianth-tube or free, globose or ovoid; style usually thick, often curved; stigma dilated, irregularly lobed. *Fruit* globose, ovoid, ellipsoid or cylindric, resting on the more or less enlarged perianth-tube and supported by the more or less enlarged pedicel; the enlarged perianth-tube sometimes very small and merely supporting the fruit, sometimes obconic or cupular partly enclosing it, sometimes even much enlarged and almost wholly enclosing it; perianth-lobes usually deciduous, occasionally persistent; pericarp usually succulent. *Seed* 1; testa thin; cotyledons conform to the seed, fleshy.—**DISTRIB.** Tropical and subtropical Asia, in India, Burma, the Malayan Peninsula and Archipelago eastwards to Japan, south to the Pacific Islands, Australia and New Zealand; scarce in Africa and America: species from 150 to 200.

In preparing the following key, I have reluctantly been obliged to abandon the idea of arranging the species under the old subgenera having found the task almost impossible. However, in avoiding characters taken from the flowers and relying chiefly upon those of the leaves, inflorescence and fruit, I think I may have made it more easy to follow in the field, where a worker can only very rarely have at his command specimens of both ♂ and ♀ plants as well as of the fruit. It may not be out of place to sound a note of warning as to the fruit; the enlarged perianth forming the cupule varies greatly as it develops gradually to maturity; and mature specimens are quite necessary for proper identification. The flowers in this genus are very variable but in a single umbellule there are usually one or two flowers with the normal number of parts, the rest frequently varying considerably from them, the central flower often having more than the normal number.

I need say little on the reasons for the adoption of *Litsea*, Lamk., as the generic name; for the subject was fully gone into first by Jussieu in the *Annales d'Hist. Nat.* VI. 197 who fixed on *Litsea*, and by Blume in *Mus. Bot. Lugd.-Bat.* I. 371 who decided to adopt *Tetranthera*, Jacq., and afterwards by Bentham and Hooker in the *Gen. Pl.* III. 162 who showed that *Litsea*, Lamk., was the correct name. They have been followed in this by Pax in Engler and Prantl *Naturl. Pflanzenfam.* III. 2. 199.

Leaves alternate. (Nos. 1-48.)

Leaves hairy on the lower surface. (Nos. 1-12.)

Perianth-lobes incomplete or 0; tomentum grey

Umbellules in pedunculate umbels or corymbs up to 5 cm. long; leaves usually obtuse .. 1. *L. chinensis*.

Umbellules in almost subsessile clusters; leaves short-acuminate .. 2. *L. tomentosa*.

Perianth-lobes complete; tomentum usually more or less reddish. (Nos. 3-12.)

Umbellules on woody tubercles from the trunk of the tree

Leaves under 30 cm. long, 10 cm. broad, purplish-red beneath .. 3. *L. johorensis*.

Leaves over 30 cm. long, 10 cm. broad, rusty-tomentose beneath .. 4. *L. trunciflora*.

Umbellules in clusters or racemes on the branchlets. (Nos. 5-12.)

Leaves coriaceous, obovate, usually very large, nerves and nervules very strong; branchlets very stout

Umbellules peduncled, in short thick racemes scarcely 1 cm. long; leaves rusty beneath .. 5. *L. grandis*.

Umbellules subsessile, in racemes 4-6 cm. long; leaves greyish beneath .. 6. *L. artocarpifolia*.

Leaves subcoriaceous, lanceolate, rather small, nerves and nervules strong, branchlets moderately stout .. 7. *L. firma*.

Leaves chartaceous or membranous, small to moderate-sized

Umbellules in short clusters. (Nos. 8-11.)

Branchlets very slender; leaves oblong-lanceolate; umbellules subsessile, in clusters of only 2-3 .. 8. *L. gracilis*.

Branchlets moderately stout

Leaves elliptic-lanceolate; umbellules in many-flowered fascicles; fruit ovoid; fruiting perianth very small .. 9. *L. amara*.

Leaves broadly elliptic or orbicular.

Leaves elliptic, ovate or orbicular, strongly nerved, densely rufous

- hirsute; umbellules in clusters of 3—4 .. 10. *L. hirsutissima*.
- Leaves elliptic or elliptic-oblong, sparsely grey-or tawny-pubescent; umbellules in dense clusters .. 11. *L. polyantha*.
- Umbellules in racemes reaching 10—16 cm. in length; leaves cordate; fruit oblong; fruiting-perianth obconic, very small .. 12. *L. cordata*.
- Leaves glabrous or only slightly hairy on the lower surface. (Nos. 13—48.)
- Umbellules in clusters or short racemes (in 15 *L. brachystachya* paniced). Nos. 13—36.)
- Fruit small, under 7 mm. in diameter; fruiting perianth very small, scarcely enlarged. (Nos. 13—15.)
- Umbellules in clusters or very short racemes under 1 cm. long
- Leaves membranous, lanceolate, strongly scented .. 13. *L. citrata*.
- Leaves chartaceous, more or less elliptic, long-petioled .. 14. *L. petiolata*.
- Umbellules in panicles of racemes reaching 4—10 cm. in length, leaves elliptic, chartaceous .. 15. *L. brachystachya*.
- Fruit oblong, 2 cm. by 1 cm., pedicel long, clavate; leaves coriaceous; fruiting perianth small, flattened. 6 mm. in diameter .. 16. *L. angulata*.
- Fruit moderate-sized, about 1 cm. in diam., pericarp thin; fruiting perianth, chartaceous, cleft; leaves submembranous, rather large, glaucous beneath .. 17. *L. spathacea*.
- Fruit moderate-sized, 8—15 mm. in diam.; fruiting perianth cup-shaped bearing the remains of the lobes and staminodes. (Nos. 18—19.)
- Leaves oblanceolate, 23—43 cm. long, nearly glabrous, pergamaceous; fruiting perianth thin; umbellules in clusters on branches below leaves .. 18. *L. magnifica*.
- Leaves elliptic-oblong under 25 cm. long; fruiting perianth thick; umbellules in clusters among the leaves or below them
- Leaves chartaceous, young slightly pubescent, transverse nervules prominent; peduncles of

- umbellules slender, up to 12  
mm. long .. .. 19. *L. Ridleyi*.
- Leaves coriaceous, young softly  
tomentose, transverse nervules  
obscure; peduncles of umbel-  
lules thick, under 5 mm. long.. 20. *L. penangiana*.
- Fruit moderate-sized to large; fruiting  
perianth with entire margins, the lobes  
and staminodes deciduous. (Nos. 21-29.)
- Leaves more or less elliptic, usually  
over 20 cm. long; fruiting perianth  
thick, cup-shaped; umbellules axil-  
lary or lateral among the leaves  
or a little below them
- Fruit ovoid; fruiting perianth not  
spotted, rather large and long-  
pedicelled; leaves chartaceous,  
more or less ovate, dark red-  
dish-brown when dry, under 10  
cm. broad .. .. 21. *L. castanea*.
- Fruit ellipsoid-oblong, 2 cm. by 1  
cm.; fruiting perianth smooth,  
with short pedicels; leaves  
coriaceous, more or less ovate,  
under 4 cm. broad .. 22. *L. quercina*.
- Fruit cylindric-oblong, 2 cm. by  
under 1 cm.; fruiting perianth  
rough, with short pedicels;  
leaves coriaceous, more or less  
obovate, 4-9 cm. broad .. 23. *L. cylindrocarpa*.
- Leaves more or less oblong, 15-30  
cm. long or more; fruiting perianth  
thick, cup-shaped or saucer-shaped,  
spotted; umbellules axillary or  
lateral among the leaves or below  
them, flowers scarcely known
- Leaves elliptic-oblong or oblong-  
lanceolate, 3-5 cm. broad,  
reddish beneath, transverse  
nervules and reticulation vis-  
ible; fruit globose, 10 mm. in  
diam. with a large spotted cup 24. *L. Wrayi*.
- Leaves oblong-lanceolate, 4-7  
cm. broad, transverse nervules  
and reticulation obscure; fruit  
globose, apiculate, 16 mm. in  
diam., pedicel short .. 25. *L. singaporensis*.
- Leaves oblong-obovate or -ob-  
lanceolate, 5-8 cm. broad,

- transverse nervules and reticulation faint; fruit globose, apiculate, 10 mm. in diam., pedicel long .. 26. *L. perakensis*.
- Leaves elliptic-oblong, 8—14 cm. broad, transverse nervules and reticulation faint; fruit globose, 15 mm. in diam. .. 27. *L. pustulata*.
- Leaves subcoriaceous, oblong or obovate, glaucous beneath, 20—40 cm. long; fruiting perianth patelliform, 10—12 mm. in diam. supporting the globose fruit, 15 mm. in diam. .. 28. *L. patellaris*.
- Leaves pergamaceous, oblong-obovate, 15—35 cm. long, subglaucous beneath; fruiting perianth very large and woody enclosing the globose fruit .. 29. *L. fenestrata*.
- Fruit wanting. (Nos. 30-37.)
- Leaves elliptic, nerves prominently parallel, close, more than 8 pair.
- Leaves cuspidate-acuminate; racemes grey-pubescent .. 30. *L. Foxiana*.
- Leaves acute or acuminate only; racemes nearly or quite glabrous .. 31. *L. monicola*.
- Leaves oblong-lanceolate or oblanceolate, nerves distant and somewhat irregular (Nos. 32-37).
- Leaves lanceolate, long acuminate, areolate; racemes 3—5 mm. long .. 32. *L. Scortechinii*.
- Leaves oblanceolate, greyish-subglaucous beneath, usually under 6 cm. broad, apex with an acumen
- Upper surface of leaves dark; racemes 8—15 mm. long, peduncles 10—12 mm. long .. 33. *L. ochracea*.
- Upper surface of leaves pale; racemes under 7 mm. long, umbellules sessile .. 34. *L. oblanceolata*.
- Leaves oblong-lanceolate, subglaucous beneath; usually over 6 cm. broad, apex rounded; involucre densely grey-puberulous .. 35. *L. Kunsteri*.

- Leaves elliptic-lanceolate or -oblan-  
ceolate, acuminate, glaucous be-  
neath, nerves distant, 6 pairs;  
umbellules subglabrous, peduncles  
10—20 mm. long .. 36. *L. claviflora*.  
Leaves ovate or elliptic, scarcely 10  
cm. long, nerves 4—6 pairs; ped-  
uncles glabrous 5 mm. long .. 37. *L. Helferi*, var.  
*ovata*.

Flowers in elongated racemes (in 38 *L. myristicaefolia*  
scarcely over 2 cm. long. (Nos. 38—48.)

Leaves narrow, rarely over 7 cm. broad or 20  
cm. long, more or less glabrous. (Nos. 38—41.)

Racemes short, glabrous; leaves coria-  
ceous; fruiting perianth fleshy, near-  
ly at right angles with the long  
peduncle, half enclosing the globose  
fruit 8 mm. in diam. .. 38. *L. myristicaefolia*.

Racemes moderately long, glabrous  
Leaves coriaceous, elliptic-oblong,  
abruptly acuminate; racemes  
2—5 cm. long; fruiting peri-  
anth cup-shaped to flattened;  
fruit ovoid to globose, 15—18  
mm. in diam. .. 39. *L. Teysmanni*.

Leaves coriaceous, oblong-lanceo-  
late, long acuminate; racemes  
7—9 cm. long; fruiting peri-  
anth hemispheric on an enlarged  
clavate pedicel and half enclos-  
ing the globose fruit 10 mm. in  
diam. .. 40. *L. machiliifolia*.

Racemes up to 17 cm. long, pubescent;  
leaves chartaceous, oblong-lanceo-  
late, puberulous beneath .. 41. *L. Panamonja*.

Leaves broad. (Nos. 42—48.)

Racemes glabrous  
Leaves submembranous, elliptic;  
racemes 10—25 cm. long;  
branchlets angular, almost wing-  
ed; fruit not known .. 42. *L. Curtisii*.

Leaves coriaceous, oblanceolate;  
racemes 10 cm. long; branch-  
lets rounded; fruit depressed-  
globose enclosed in a woody  
nest-like cupule about 2 cm.  
in diam. .. 43. *L. nidularis*.

Racemes puberulous, up to 15 cm.  
long; leaves coriaceous, elliptic-



obovate, up to 45 cm. long and 20 cm. broad; fruit globose 2.5—3 cm. in diam. on a saucer-shaped cupule 25 mm. in diam. ..

44. *L. megacarpa*.  
Racemes tomentose or pubescent. (Nos. 45—48.)

Racemes rather short, up to 10 cm. long; leaves coriaceous, oblong-lanceolate with broad midrib; fruiting perianth obconic, 25—30 mm. in diam. ..

45. *L. sebifera*.

Racemes long, reaching 16—20 cm.

Leaves coriaceous, glabrous, oblong or oblanceolate; petiole 4—7 cm. long ..

46. *L. Mainyayi*.

Leaves scarcely coriaceous, elliptic-oblong, under surface pubescent; petiole under 4 cm. long

Leaves reddish beneath; fruiting perianth cup-shaped, smooth, 15—20 mm. in diam.; stamens sometimes 6 only ..

47. *L. Noronhæ*.

Leaves greyish beneath; fruiting perianth saucer-shaped, pustulate, 27 mm. in diam. ..

48. *L. robusta*.

Leaves opposite or subopposite, sometimes alternate. (Nos. 49—55.)

Leaves more or less elliptic-lanceolate, under 20 cm. long, 6 cm. broad, glabrous or slightly pubescent.

Leaves long-cuspidate-acuminate; main nerves 5—7 pairs ..

49. *L. sarawacensis*.

Leaves obtuse, acute or only shortly acuminate.

Leaves membranous or chartaceous, main nerves 8—12 pairs; fruit ellipsoid, 5 mm. in diam.; fruiting perianth very small with persistent lobes ..

50. *L. lancifolia*.

Leaves pergamaceous, main nerves 6—8 pairs; fruit cylindric-oblong, 6—7 mm. in diam.; fruiting perianth 7 mm. in diam., lobes deciduous ..

51. *L. gracilipes*.

Leaves obovate-oblong or -oblanceolate, grey- or rusty-pubescent or -tomentose

Leaves membranous to chartaceous, grey-pubescent beneath; transverse nervules and reticulation obscure ..

52. *L. ujongensis*.

Leaves chartaceous, rusty-pubescent beneath,

- transverse nervules and reticulation prominent .. .. 53. *L. sessiliflora*.  
 Leaves coriaceous, rusty-tomentose beneath, transverse nervules and reticulation obscure.  
 Umbellule-peduncles 5—10 mm. long; fruiting perianth saucer-shaped, thin, 10—20 mm. in diam; leaf-tomentum dark brown when dry .. .. 54. *L. ferruginea*.  
 Umbellule peduncles 10—20 mm. long; fruiting perianth cup-shaped, thick, 17 mm. in diam.; leaf-tomentum light brown when dry .. .. 55. *L. Griffithii*.

1. *LITSEA CHINENSIS*, Lam. Encyc. Méthod. III. 574 (1789).

A small or moderate-sized evergreen tree of variable leaves and inflorescence, pubescence, etc.; branchlets terete, glabrescent; buds perulate, densely silky tawny-pubescent as are the innovations. *Leaves* chartaceous or thinly coriaceous, alternate or subopposite or subverticillate at the ends of the branchlets; lanceolate or oblong or elliptic, sometimes even ovate or obovate, acute or obtuse at apex, usually acute at base; upper surface somewhat shining, closely but markedly minutely reticulate, glabrous except on the midrib, olive green when dry, lower surface paler and varying from glabrous to densely grey-pubescent; 10—25 cm. long, 4—10 cm. broad; midrib broad, pubescent; main nerves about 8—10 pairs, often branched; transverse nervules irregular and distant; reticulation minutely netted; petiole 1—3 cm. long, grey-pubescent to glabrous. *Flowers* in umbellules, in axillary or lateral pedunculate umbels or corymbs up to 5 cm. long, the ♀ rather shorter than the ♂; umbels of 2—5 umbellules on peduncles 5 mm. (♀) to 12 mm. (♂) long; umbellules 12 mm. broad (♂), half that size (♀) with 4 concave pubescent involucre bracts the outer pair orbicular, the inner narrower; flowers in each umbellule about 10 to 12, fewer and much smaller in ♀ than in ♂; pedicels about 2 mm. long; perianth-tube short; perianth-lobes incomplete, sometimes 0, rarely more than 2 or 3, when present linear or spatulate, pubescent. *Stamens* of ♂ flowers normally 12, sometimes fewer, sometimes up to 15 or even more, those of outer rows 10 mm. long, on slender villous filaments and with subquadrate anthers; those of inner rows rather shorter and with a pair of long-stalked clavate glands attached at the very base of the filaments; rudimentary ovary often 0, when present conical and very small. *Staminodes* of ♀ flowers normally 12 sometimes fewer, often more, those of outer rows spatulate, 2 mm. long, with villous filaments,

those of inner rows similar with long-stalked clavate glands as in ♂. *Ovary* ovoid, glabrous; style long, thick; stigma peltate, often lobed. *Fruit* small, 7—10 mm. in diameter, globose, seated on the very slightly enlarged flattened tube of the perianth, about 2 mm. broad; pericarp thin, black or purple; cotyledons hemispherical. Trimen Fl. Ceyl. III. 449; Cooke Bomb. Fl. II. 539; Koord. & Val. Bijdr. X. 134. *L. sebifera*, Pers. Syn. II. 4 (1807); Hook. f. Fl. Br. Ind. V. 157; Prain Beng. Plants 902; Brandis Ind. Trees 536. *L. multiflora*, Bl. Bijdr. II. 564 (1825). *L. glabraria* and *laevis*, Juss. in Ann. Mus. VI. 212. *L. geminata*, Bl. Bijdr. 564. *L. tetranthera* and *platyphylla*, Pers. l.c. *Tetranthera laurifolia*, Blume Mus. Bot. Lugd.-Bat. I. 372; Nees in Wall. Pl. As. Rar. II. 66, III. 30; Meissn. in DC. Prodr. XV. 1. 178; Roxb. Fl. Ind. III. 823; Bot. Reg. t. 893; Wall. Cat. 2550 C. and 2555 A.D.; Brandis For. Fl. 379; Kurz For. Fl. II. 297; Benth. Fl. Austral. V. 305. *T. Roxburghii*, Nees l.c. 65. and 30 and Syst. 515. *T. apetala*, Roxb. Cor. Pl. II. 25. t. 147 and Fl. Ind. III. 819; Gaertn. f. Fruct. III. 226. t. 222; Wall. Cat. 2554 B. and C. *T. litoralis*, Bl. l.c. 375. *T. glabraria*, *laevis* and *geminata*, Nees Syst. Laur. l.c. *T. tomentosa*, Nees in Wall. l.c. 65 and Syst. Laur. 511. *Glabraria tersa*, Linn. Mant. 276; Miq. Fl. Ind. Bat. 941; *G. litoralis*, Miq. l.c. 943. *Tomex tetranthera* and *sebifera*, Willd. Sp. Pl. II. 839, 840. *Sebifera glutinosa*, Lour. Fl. Cochinch. II. 783. *Laurus involucrata*, Koenig in Retz. Obs. VI. 27.

Malay Peninsula, *vide* Hook. f. in Fl. Br. Ind.; Koord. & Val., etc.—DISTRIB. India, Burma, Ceylon, Andaman Islands, Malay Islands, China, Australia.

There are no specimens of this species from our area in the Kew or Calcutta or Singapore Herbaria; but it seems best to include the description. I have been in doubt whether I should not follow Merrill and call it *L. tersa*, Merrill, in Philipp. Journ. of Sc. I. 57 (1906); but after much consideration have preferred to leave it under the better known name adopted by such authorities as Trimen, Cooke and Koorders & Valetton.

2. *LITSEA TOMENTOSA*, Blume Bijdr. 566 (1825). A tree reaching 15—20 m. in height and a diameter of bole of 45 to 60 cm.; branchlets stout, rough, puberulous, uppermost and innovations tawny-pubescent; buds oblong. *Leaves* membranous when young, chartaceous when older, obovate or oblong-obovate, abruptly short-acuminate at apex, cuneate at base; upper surface shining, puberulous when young, afterwards glabrous except on the midrib and main nerves, lower surface minutely grey-tawny-pubescent; 12—20 cm. long, 4—10 cm. broad; midrib stout, broad, pubescent; main

nerves 12—15 pairs, straight at first afterwards curved near the margin; transverse nervules prominent in old leaves, reticulation minutely netted; petiole 2—3 cm. long, stout, tawny-pubescent. *Flowers* in umbellules, in dense axillary or lateral bracteate clusters on a very short stout common peduncle about 5 mm. long; bracts oblong, densely grey-pubescent without; umbellule-peduncles thick, grey-pubescent, 5 mm. long; involueral bracts 4, orbicular, concave, grey-pubescent without, glabrous within, about 4 mm. in diam.; flowers in umbellule 5, on short pedicels 2 mm. long; perianth-lobes small, incomplete, ovate-acute or sublinear, sometimes missing. *Stamens* of ♂ flowers “20—24 slightly longer than the perianth lobes, with villous filaments; glands about 8—12, obconic, stipitate, hidden in the villous hairs of the tube; rudimentary ovary small glabrous; stigma 0.” *Staminodes* of ♀ flowers many (up to 30) densely imbedded in stiff tawny hairs; those of outer rows spathulate on slender villous filaments, those of inner rows with a pair of stalked clavate glands inserted at the bases of the filaments. *Ovary* ovoid; style thick; stigma large, peltate, often lobed. *Fruit* “ellipsoid, obtuse, about 3 cm. long, 1.5—2.5 cm. broad, seated on the cupular enlarged perianth-tube 2 cm. broad 3 mm. high, the margin irregularly 9—12-toothed or subentire; pedicel obconic, 1.5—2.5 cm. long, often much incurved.” Koord. & Val. Bijdr. X. 133. *Tetranthera vestita*, Nees Syst. Laur. 551; Blume Mus. Bot. Lugd.-Bat. I. 372; Meissn. in DC. Prodr. XV. i. 178. *Glabraria vestita*, Miq. Fl. Ind. Bat. I. 941. *Polyadenia grandis*, Hassk. Cat. Bog. 566, non Nees.

PENANG: at West Hill, 75 m. alt., *Curtis* 1182!; in dense jungle at Larut 90—150 m. alt., *King's Collector* 5886!—DISTRIB. Java.

The leaves of *Curtis* specimens are thicker and stouter than those of *Kunstler*, but they are older; and the inflorescence (♀ in both) is the same. This is apparently the oldest use of the specific name *tomentosa*: the S. Indian *L. tomentosa*, Wall. Cat. 2550 will have to be called *L. apetalá*. The descriptions of the stamens (♂) and fruit are taken from *Koorders* and *Valeton*. The Javan specimen in *Herb. Kew* (♀) has the leaves rather broader and more obovate than is the case with the Peninsular ones; but in other respects it agrees, and I see no reason to doubt the identification.

3. *LITSEA JOHORENSIS*, Gamble in *Kew Bull.* 315 (1910). A small evergreen tree with smooth white bark; branchlets grey, rather slender, the uppermost densely red-brown-tomentose as are the lanceolate buds, the petioles and undersurface of the leaves and the inflorescence. *Leaves* coriaceous, alternate, somewhat crowded to-

wards the ends of the branchlets; oblanceolate, acuminate usually abruptly at apex, long attenuate at base; upper surface dark brown and dull when dry, glabrous except the puberulous midrib and main nerves, areolate reticulate, lower sparsely tomentose purplish-red when dry; 10—30 cm. long, 4—10 cm. broad; midrib rather slender, impressed above; main nerves 10—14 pairs impressed above, starting at about 70° with the midrib and at once curving upwards to and along the margin; transverse nervules rather irregular and branched, not very prominent, enclosing the areolate reticulation; petiole rather slender from a thickened base, channelled above, 1.5—3.5 cm. long. *Flowers* in umbellules on slender tomentose peduncles 15 mm. long (♂) several together on hard woody tubercles with rugosely scarred cylindric branches up to 18 mm. long on the tree-trunk; the umbellules when open reaching 15 mm. in diam. (♂), or 10 mm. (♀); involucre bracts 4—5, orbicular, concave, tomentose without, glabrous within; flowers in each umbellule 6—7, subsessile; perianth-lobes 6, oblong or spatulate, obtuse, sparsely villous, 5—7 mm. long, much gland-dotted. *Stamens* of ♂ flowers variable in number, normally 9, but often 10, those of the outer rows up to 9 mm. long with large 3 mm. long oblong anthers and slender slightly villous filaments, sometimes with 1 or 2 small glands at the base, those of the inner row shorter and with a pair of reniform and usually emarginate shortly stipitate glands at the base itself; anther-cells very large, elliptic-oblong, the upper introrse, the lower lateral; rudimentary ovary ovoid; style thick; stigma spreading, bifid. *Staminodes* of ♀ flowers variable in number, normally 9 but often up to 12, those of the outer rows linear subulate, slender, slightly villous, 3 mm. long, sometimes with glands at their bases; those of the inner rows triangular-acuminate with 2 large basal glands, 1 mm. long. *Ovary* ovoid, glabrous; style thick, curved; stigma large, peltate, irregularly lobed. *Fruit* (immature) ovoid, truncate at apex, apiculate, half-enclosed in the hemispheric rough persistent perianth-tube 6 mm. long and 10 mm. in diam. at the mouth which is entire or lobed and bears remains of the perianth-lobes and staminodes; enlarged pedicel very stout, short; pericarp smooth.

JOHORE: at Tanyong Bunga, *Ridley* 6458!, near Castlewood, *Ridley* 9163!, at the Mount Austen, *Ridley* 11995!, at Seduah, *Ridley* 13479!

This species comes rather near to *L. cauliflora*, Stapf in Trans. Linn. Soc. 2nd Ser. IV. 219 collected by Haviland on Mt. Kinabalu in Borneo at 5000 ft.,



but the venation of the leaves is different and the umbellules are much larger. The specimens of the ♀ flowers and young fruit were found separate with Ridley's No. 6458 which is otherwise ♂; they must have been collected on a different tree.

4. *LITSEA TRUNCIFLORA*, Gamble in Kew Bull. 316 (1910). A handsome evergreen tree reaching 18 m. in height and 30—40 cm. in diam. of stem; bark of stem greyish-brown, smooth; branchlets rather stout, pale brown, the uppermost and lanceolate buds and the petioles of the leaves dark brown rusty-tomentose. *Leaves* chartaceous, alternate; obovate or oblanceolate, rounded or emarginate at apex, long-cuneate-attenuate at base; upper surface shining, glabrous except the villous midrib, areolate-reticulate, lower blue-green when fresh, pale grey-brown when dry, softly rusty-tomentose especially on the nerves; margin recurved; 28—56 cm. long, 11—22 cm. broad; midrib very stout, impressed above, much raised beneath; main nerves 16—22 pairs, impressed above, prominent beneath, often branched and with secondary nerves between, starting usually at from 70°—80° or sometimes at right angles to the midrib, at first straight but curving near the margin to meet in irregular loops; transverse nervules distant, irregular, often branched, prominent, enclosing the areolate reticulation which is best seen on the upper surface; petiole very stout, flattened above, 1.5—2.5 cm. long. *Flowers* in umbellules on rather slender pubescent peduncles 10—15 mm. long (♂) 7—8 mm. (♀) many together on hard thick woody tubercles on the tree-trunk, the clusters about 5 cm. in diam.; umbellules (♂) 10—12 mm. in diam. when open; involucrel bracts 4, orbicular, concave, minutely puberulous without, glabrous within; flowers in each umbellule 4—5, sessile; perianth-lobes 6, very variable, mostly linear-oblong, toothed at the apex, sparsely villous, gland-dotted, 5—6 mm. long. *Stamens* of ♂ flowers variable in number, usually 9 or 12; those of the outer rows 7—8 mm. long with oblong anthers and very slender villous filaments, sometimes with glands at the base; those of the inner rows shorter and with a pair of rounded often emarginate very shortly stipitate glands close to the base; anther-cells very large, elliptic, upper all introrse, lower lateral; rudimentary ovary ovoid; style slender, much curved, glabrous; stigma large, peltate, bifid. *Staminodes* of ♀ flowers apparently all with basal glands, outer linear-clavate, villous, 3 mm. long, inner shorter, the glands thick. *Ovary* ovoid; style slender, straight; stigma peltate. *Fruit* (very unripe) depressed globular, enclosed almost completely in the turbinate enlarged perianth-tube.

which when young is nearly globular with a small orifice bearing remains of the perianth-lobes and staminodes.

PERAK: open jungle in Goping District at 150—300 m. alt., King's Collector 4582!, 8211! *Herb. Singap.* No. 448 (♀)! Vern. 'Suko Medang Kunit', without locality.

This species, to judge by leaf-specimens, which is all that is available (in *Herb. Calc.*) of *Tetranthera? ochracea*, Miq. *Fl. Ind. Bat. Suppl.* I. 146, 363, comes very near that species; but the venation does not fully agree.

5. *LITSEA GRANDIS*, Hook. f. in *Fl. Br. Ind.* V. 162 (1886). A large tree reaching 25 to 30 m. in height and 60—90 cm. diam. of stem; bark warted; branchlets very stout, angular, the upper ones densely tawny-tomentose; buds ovoid, 1—3 cm. long, velvety. *Leaves* coriaceous, alternate; broadly obovate or orbicular-ovate or -obovate, generally obtuse but sometimes acute or shortly acuminate at apex, attenuate or rounded or sometimes subcordate at base; upper surface dull or shining, glabrous except the midrib and main nerves, lower densely rusty-tomentose; margins recurved; 10—30 cm. long, 5—18 cm. broad; midrib very stout, flat and tomentose above or sometimes impressed, prominent beneath; main nerves 12 to 20 pairs, divergent from the midrib at from 60°—70°, straight to near the margin where they curve upwards, deeply impressed above, raised beneath; transverse nervules very many and prominent, regular, ladder-like; reticulation in the intervals again more or less transverse; petiole very stout, 2—4 cm. long. *Flowers* in pedunculate (7—15 mm.) umbellules in short (up to 10 mm.) axillary or lateral thick racemes of about 10; involucre bracts 5, orbicular, concave, densely greyish silky tomentose without; open umbellules 10 mm. broad in ♂, 7—8 mm. in ♀; flowers in each umbellule 5—7 in ♂, 4—5 in ♀; pedicels stout; perianth-tube short, lobes linear-oblong in ♀, lanceolate-acute in ♂, silky, about 4 mm. long, 6—8 in ♂, fewer in ♀. *Stamens* in ♂ flowers normally 12, but frequently more, up to 21; those of the 2 outer rows normally eglandular, but frequently with 1 or more stipitate glands, anthers short truncate at base, rounded above, filaments very slender, sparsely strigose, 3—4 mm. long; those of the inner rows shorter and with a pair of small clavate stipitate glands at the base; upper anther-cells introrse, lower lateral; rudimentary ovary 0. *Staminodes* of ♀ flowers normally 12; those of outer rows clavate, 2 mm. long, the filaments villous; those of inner rows linear and with a pair of shortly-stalked small glands at the base. *Ovary* ovoid, glabrous; style thick, bent



to a hook at the top; stigma peltate, lacerate. *Fruit* ellipsoid, 11—16 mm. long, 8—10 mm. broad, seated on the obconical thin enlarged perianth-tube, 5—7 mm. high, 8 mm. in diam., the margins sharp, entire crenulate or sometimes cleft; pedicels much thickened, 6 mm. long; pericarp yellowish, shining, smooth, glabrous. Brandis Ind. Trees 537. *Tetranthera grandis*, Wall. Cat. 2552; Meissn. in DC. Prodr. XV. 1. 188; Kurz. For. Fl. II. 299. *Polyadenia grandis*, Nees in Wall. Pl. As. Rar. II. 62 and Syst. Laur. 574.

PENANG: Porter (Wallich 2552)!; on Government Hill, Curtis 1104!. PERAK: at Lower Camp, Gunong Batu Pateh, Wray 1100!, 1157!; in hilly country at 150—300 m., King's Collector 5888!, 10918! MALACCA: Maingay K. D. 1256!. SINGAPORE: at Changchukang, Changi, Bukit Timah, etc. Ridley 3962!, 4700!, 5062!, 5974!, 5975!, 6452!, 10698!, 10802!, 10859!; Cantley 116!—DISTRIB. Burma, Java?

6. *LITSEA ARTOCARPIFOLIA*, Gamble in Kew Bull. 316 (1910). An evergreen tree; branchlets very stout, rough, brown, marked with lenticels and large leaf-scars, uppermost and large ovate-lanceolate buds densely rusty-pubescent. *Leaves* coriaceous, alternate; obovate, obtuse or slightly apiculate at apex, attenuate at base; upper surface shining, glabrescent except on the midrib and nerves, lower surface grey, closely rusty-pubescent; margin recurved; 20—25 cm. long, 9—12 cm. broad; midrib stout, very broad (4 mm. near base) depressed above, much raised beneath; main nerves about 20 pairs, regular, parallel, impressed above, prominent beneath, at about 60°—70° with the midrib, at first straight then curving to join the margin; transverse nervules many, prominent, straight or branched; reticulation obscure; petiole very stout, 10—15 mm. long, channelled above. *Flowers* in sessile or very shortly peduncled umbellules, closely packed in rusty-pubescent racemes 4—6 cm. long from the axils of fallen leaves on the last shoot; umbellules (♂ only) when open 15 mm. in diam.; involucre bracts 5, orbicular, concave, enclosing 6 flowers; pedicels stout, villous, 4 mm. long; perianthlobes 6—8, oblong-lanceolate, acuminate, silky-villous on both sides, 5 mm. long. *Stamens* of ♂ flowers 9—15, apparently normally 12, of which those of the outer rows 8 mm. long, eglandular or sometimes with glands; those of the inner rows a little shorter, and furnished with a pair of large reniform often emarginate stipitate glands a little above the bases of the villous slender filaments; anthers obovate, the upper cells introrse, the lower lateral; rudimentary

ovary 0 or very small with small capitate stigma. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK : at Relan Tujur, Wray 2233 !.

In leaf this species resembles *L. grandis* but differs in the much longer racemes, the nearly sessile umbellules, the broader leaf-midrib and other points.

7. *LITSEA FIRMA*, Hook. f. in Fl. Br. Ind. V. 162 (1886). A very large tree, reaching a height of 30—40 m. and a diameter of 1 metre or more; branchlets moderately stout, greyish-brown, the uppermost and innovations minutely rusty puberulous; buds lanceolate, not perulate. *Leaves* subcoriaceous, alternate; oblong-lanceolate or oblanceolate, obtuse or acute, rarely acuminate at apex, cuneate often unequally at base; upper surface dull, glabrous, reddish-brown, lower minutely reddish or greyish rusty-puberulous, at length glabrous; 8—18 cm. long, 3—5 cm. broad; midrib moderately stout, somewhat channelled on the upper surface, much raised on the lower; main nerves 10—15 pairs, rather irregular, curving upwards to and along the margin, more or less impressed above; transverse nervules many and conspicuous on the under surface, often branched or irregular; reticulation areolately pitted on the upper surface (under the lens); petiole 1—2 cm. long, rather slender. *Flowers* in peduncled (5—7 mm.) umbellules in rusty-pubescent axillary or lateral umbelliform racemes of about 5—6; umbellules in ♂ about 7 mm. in diameter with 4—6 concave orbicular involucre bracts; flowers in umbellule 5—6, shortly pedicelled; perianth-tube in ♂ very short; lobes oblong, tawny-villous, 2—3 mm. long, subacute, those of ♀ slightly smaller. *Stamens* in ♂ flowers 9, those of the 2 outer rows eglandular 6—8 mm. long, with long filiform sparsely hispid filaments and oblong anthers, those of the inner row similar or rather shorter with smaller anthers and a pair of reniform stipitate glands at the bases of the filaments; lower anther-cells lateral, upper large and introrse in the outer rows, minute or even wanting in the inner row; rudimentary ovary 0. *Staminodes* of ♀ flowers linear, subulate, with hispid filaments 2—3 mm. long, the inner three with a pair of reniform stipitate glands at the base. *Ovary* not seen. *Fruit* ovoid-oblong, truncate at apex, 10—12 mm. long, 8 mm. broad, seated on the shallow obconic enlarged perianth-tube 3 mm. high, 6—7 mm. in diameter; enlarged pedicel stout, 5 mm. long; pericarp pink when ripe, smooth. *Tetranthera firma*, Blume Mus.

Bot. Lugd.-Bat. I. 381; Meissn. in DC. Prodr. XV. 1. 190; Miq. Fl. Ind. Bat. I. 950.

PERAK: hills near Larut at 120—180 m. alt., *King's Collector* 6772!, 7931!. MALACCA: *Maingay* K. D. 1271!; *Kofar Ali* 4!. SINGAPORE: at Bukit Timah, *Ridley* 6453!, at Chauchukang 6820!—DISTRIB. Sumatra, at Bigin Telok, 150 m. alt., *Forbes* 3239!; Borneo, *Korthals*; Celebes.

*Ridley's* specimens have the leaves more rusty-puberulous and the young fruit cupules nearly globose with small orifice, but the orifice widens later on to a shallow cup; and I see no reason to doubt their identity.

8. *LITSEA GRACILIS*, Gamble in Kew Bull. (1910). A small tree; branchlets very slender, densely tawny-pubescent, innovations silky. *Leaves* membranous, alternate; oblong-lanceolate, acuminate at apex, attenuately acute at base; upper surface shining, glabrous except on the midrib; lower sparsely villous, closely so on the midrib and main nerves; 8—14 cm. long, 2—4 cm. broad; midrib slender, slightly impressed above; main nerves 8—10 pairs, starting at about 70° with the midrib and curving at once upwards to and along the margin and breaking up in small diminishing loops; transverse nervules irregular, branched; reticulation obscure; petiole slender, 4—5 mm. long. *Flowers* in small pale brown umbellules on very slender short (.3 to .4 mm.) peduncles, 2—3 together in the axils of upper leaves; umbellules of ♂ 4 mm. in diam. in flower; involucre bracts 4, straw-coloured, membranous, villous without, glabrous within, ovate, concave; flowers in each umbellule 3, pedicels minute; perianth-lobes very thin, obovate, villous outside, gland-dotted, 1—1.5 mm. long in ♂, under 1 mm. in ♀. *Stamens* of ♂ flowers 9, exsert, those of the outer rows 6, nearly 2 mm. long with small obovate anthers and slender long-pilose filaments; those of the inner row 3, similar but shorter and with a pair of rounded subsessile glands at the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers 9, minute, those of the outer rows 6, clavate, with pilose filaments, those of the inner row 3 subulate with a pair of rounded glands at the base. *Ovary* globose; style thick, curved; stigma peltate, 3-lobed. *Fruit* (unripe) obovoid, apiculate, seated on the thick enlarged perianth-tube, the lobes and staminodes persistent.

PERAK: at Temango, *Ridley* 14603! (both ♂ and ♀ branches).

A very interesting and pretty species, which looks as if it were deciduous,

but there is no information about this. The flowers are very small and delicate.

9. *LITSEA AMARA*, Blume Bijdr. 563 (1825). An evergreen shrub or small tree reaching at most 12—15 m. in height and 30—40 cm. in diam. of stem; branchlets moderately stout, somewhat angled and sinuate, the uppermost and innovations rusty-tomentose. *Leaves* chartaceous when dry, alternate, very variable in shape and pubescence; elliptic or elliptic-lanceolate, obtuse or acute at apex, acute or cuneate or rounded at base; upper surface smooth, shining, lower rusty-villous, often glaucescent; 7—15 cm. long, 3—7 cm. broad; midrib prominent, channelled above, raised beneath; main nerves 8—16 pairs, spreading, curved near the margin, the lowest close, impressed above, prominent beneath; transverse nervules many, slightly arched, subparallel, also impressed above; reticulation areolate; petiole rusty-tomentose, 4—10 cm. long. *Flowers* in short-peduncled (about 5 mm.) umbellules, in few- or many-flowered racemose axillary or lateral rusty-pubescent fascicles; umbellules up to 8 mm. broad in ♂, 6 mm. in ♀, with 4—5 orbicular concave involucre bracts; flowers in each umbellule 5—7, with short pedicels; perianth-tube short, villous within with long hairs; lobes 6, unequal, from linear-oblong to obovate, glabrous or nearly so, 2—3 mm. long. *Stamens* in ♂ normally 9, those of the 2 outer rows 3—3.5 mm. long with oblong anthers and slender filaments long villous especially at base; those of the 3rd row shorter and with a pair of large subsessile reniform glands near the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers 9 to 12, those of the 2 outer rows slender, clavate, 1—1.5 mm. long, those of the inner rows subulate or clavate 1 mm. long with a pair of large reniform glands as in ♂. *Ovary* ovoid; style thick, curved above; stigma large, peltate, lobed. *Fruit* ovoid, apiculate, 8 mm. long, 6 mm. broad, seated on the only slightly enlarged perianth-tube, which is 5 mm. in diam. at the mouth and bears the remains of the perianth-lobes and staminodes; fruiting pedicel obconic, greatly thickened, up to 5 mm. long, glabrous; pericarp smooth. Hook. f. Fl. Br. Ind. V. 163; Koord. & Val. Bijdr. X. 150; Brandis Ind. Trees 536. *Tetranthera amara*, Nees Syst. Laur. 551; Bl. Mus. Bot. Lugd.-Bat. I. 379; Miq. Fl. Ind. Bat. I. 1. 949; Meissn. in DC. Prodr. XV. 1. 190; Kurz. For. Fl. II. 299. *T. fruticosa*, Nees l.c. 543. *T. capitulata*, Miq. Pl. Jungh. I. 182 and Fl. Ind. Bat. l.c.

KEDAH: at Yan, Ridley 5491!; Rawi island 15697!. PENANG:

*Wallich* 7878!, 8005; *Phillips*!; *Curtis* 326!, 733!, 1073!. 1458!; *Ridley* 9340!. PERAK: at Tapa Simpang and Tupai, *Wray* 1260!, 2038!, 2047!, 2330!, 3603!; at Tapa Temango, etc., *Ridley* 14046!, 14505!, 14508!, 14583!; *Scortechini*!; Tea Gardens, *Ridley* 2981!; near Larut, *King's Collector* 998!, 2040!, 2584!, 3033!, 3431!, 3505!, 4494!, 5927!, 7626!, 7859!. SELANGOR: at Ulu Selangor and Bukit Kutu, *Goodenough* 10544!, 10545!; at Kepong, *Burn-Murdoch* (*Ridley*) 14285!; at Kwala Lumpur, *Ridley* 7626!. MALACCA: *Maingay* K. D. 1276!; *Griffith*!. SINGAPORE: *Ridley* 4825!. —DISTRIB. Burma, Malay Archipelago.

There is a huge amount of material available for the study of this polymorphic species. The old specimens of the Calcutta Herbarium were fortunately carefully arranged some years ago by Sir George King according to varieties. According to this arrangement, the most general form, that apparently described as such in the Fl. Br. Ind., is the var. *ochracea*, Blume, which is described above and that most easily separable is var. *fusco-tomentosa*, Meissn., which is maintained in the Fl. Br. Ind. and often has stamens with only 2 cells. Were it not for Sir George King's careful work, I should have preferred to follow Koorders and Valetton and treat the whole species as one with forms gradually passing from one to the other, but I think var. *fusco-tomentosa* above-mentioned and var. *angusta*, Meissn., also admitted in the Fl. Br. Ind., are clear enough. I have further added var. *attenuata*, the form with large leaves long acuminate at apex and attenuate at base; but of this I have more doubt, for the specimens graduate into the general form on the one hand and into *angusta* on the other.

Var. *fusco-tomentosa*, Meissn. l.c. Leaves, branchlets and innovations densely villous with long golden-tawny hairs; the leaves variable, usually ovate or ovate-oblong but sometimes even oblanceolate or obovate, usually cuspidate-acuminate at apex, rounded at base but occasionally acute, the length often up to 20 cm., the breadth to nearly 10 cm.; main nerves up to 20 pairs, the lowest pairs close together; branchlets often zigzag. Flowers as in type, but stamens often only 2-celled, apparently by loss of the partitions between the upper and lower cells. Hook. f. Fl. Br. Ind. V. 163.

PERAK: at Gunong Ijuk, *Scortechini*!; at Simpang and Tupai Larut, *Wray* 2047!, 2330!. NEGRI SEMBILAN: at Gunong Angai, *Ridley* 11895!. TRINGGANU: at Bundi, *Rostado*!. MALACCA: *Griffith* K. D. 4293!; *Maingay* K. D. 1251; at Sungli Hudang, *Goodenough* 1595!. JOHORE: near Gunong Panti and at Tebong Tinggyi, *Ridley* 4156! 11050!

The many specimens with only 2-celled anthers have puzzled me considerably, other characters being decidedly those of *Litsea* and not of *Lindera*.

I can only think that it is a case where the perhaps rather artificial distinction between the species having 4 and 2 cells respectively fails, as Sir D. Brandis has shown that it also fails in *Lindera*.

Var. *angusta*, Meissn. l.c. ; Hook. f. in Fl. Br. Ind. l.c. *Leaves* glabrescent, often grey or silvery beneath, lanceolate or oblanceolate, acuminate at apex, attenuate at base. Flower-clusters axillary or lateral, ♂ with many or ♀ with few umbellules; rudimentary ovary in ♂ sometimes present, lanceolate, with long style and small capitate stigma. *Tetranthera angusta*, Wall. Cat. 6344; Nees in Wall. Pl. As. Rar. III. 30 and Syst. Laur. 641.

KEDAH: Langkawi island, *Curtis* 2610!; *Ridley* 14965!. PENANG: *Wallich* 6344!. PERAK: Upper Perak, *Wray* 3559!; Gunong Bubu, *King's Collector* 6772!, 7620!. MALACCA: *Griffith* K. D. 4295!; Sungei Udang, *Derry* 524!; Gunong Sedang, *Ridley*!; Bukit Tampu, *Goodenough* 1957!. PAHANG: Pekan, *Ridley* 2266!—DISTRIB. Burma.

Var. *attenuata*, King in Herb. Calc. *Leaves* oblong-lanceolate or -oblanceolate, acuminate at apex, narrowed or rounded at base, often nearly 20 cm. long, minutely rusty-pubescent beneath. Flower clusters with few or many umbellules, these with rather long peduncles.

PENANG: Penang Hill, Batu Feringy, etc., *Ridley* 9473!, etc. PERAK: Larut, Ulu Selangor and Ulu Bubong, *King's Collector* 4614!, 8750!, 10142!. SELANGOR: at Weld's Hill, *Burn-Murdoch* 4!. MALACCA: *Mainyay* K. D. 1266!, 1278!; at Batu Tiga, *Derry* 990!. PAHANG: at Kwala Luit, *Ridley* 2265!, at Telun, *Ridley* 13781!.

10. *LITSEA HIRSUTISSIMA*, Gamble in Kew Bull. 357 (1910). A shrub reaching 2.5 m. in height; branchlets rather stout, nearly black, the younger ones clothed with long golden hairs as are the innovations, the margins and nerves of the leaves and the inflorescence. *Leaves* soft, membranous, alternate; elliptic or elliptic-ovate, acuminate and often with a long (10—15 mm.) filiform acumen at apex, more or less rounded at base; upper surface dark green when fresh, chestnut-brown and shining when dry, the younger with prominent scattered golden stiff hairs the older glabrescent, under surface paler similarly hirsute especially on the nerves; 15—20 cm. long, 7—12 cm. broad; midrib rather slender, channelled above; main nerves 12—15 pairs, impressed above, regular and regularly curved to the margin; transverse nervules many, subparallel, conspicuous; reticu-



lation obscure; petiole stout, 1—2 cm. long, densely golden-hirsute, often geniculate at the leaf-insertion. *Flowers* in umbellules on slender, 1 cm. long, peduncles, clustered in the axils of the leaves, rarely more than 3—4 together; involucre bracts 4, concave, nerved, the margins fimbriate, hirsute without, glabrous within; flowers in each umbellule 5—6; perianth-lobes oblong, 2—3 mm. long, very glandular, nearly glabrous, the apex dentate; pedicels very short. *Stamens* of ♂ flowers 9; filaments slender, glabrous except a tuft of long hairs at their bases; anthers 4-celled, those of outer rows obovate, those of the inner row ovate with a pair of large sessile glands a little above the base of the filaments, rudimentary ovary 0. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK: road to Gunong Hijan, 750 m. alt., *Curtis* 1344!; Gopong and Thaiping 90—150 m. alt., *King's Collector* 404! 8399!

Var. *geniculata*, Gamble. *Branchlets* prominently geniculate at the nodes. *Leaves* smaller (8—12 cm. long, 6—7 cm. broad), ovate or orbicular, obtuse and sometimes slightly apiculate at apex, subcordate at base, bullate; upper surface shining, glabrous. *Flowers* similar but anthers sometimes 2-celled or with very minute upper cells, filaments sparsely hirsute.

PERAK: at Gopong, *King's Collector* 878!

This variety comes very near indeed to extreme forms of *L. amara*, var. *fusco-tomentosa*, and may be said to be a connecting link between the two species.

11. *LITSEA POLYANTHA*, Juss. in Ann. Mus. VI. 211 (1805). A moderate-sized evergreen tree, reaching 12—18 m. in height and 50—60 cm. in diam. of stem; bark dark grey; branchlets moderately stout, somewhat angular, dark brown, the uppermost and innovations with more or less tawny pubescence; buds lanceolate, leafy. *Leaves* soft when fresh, chartaceous when dry, alternate, sub-bifarious; elliptic or elliptic-oblong or suborbicular, obtuse or slightly acute at apex, rounded at base or nearly subacute; glabrous and dull on the upper surface, grey- or tawny-pubescent on the lower sometimes nearly glabrous; 7—15 cm. long, 4—10 cm. broad; midrib rather slender, impressed on the upper, raised on the lower surface; main nerves 8—12 pairs, at about 60° with the midrib at first then curving to the margin, impressed above; transverse nervules many, parallel and prominent beneath, joined again by subparallel reticulations; petiole pubescent, 12—25 mm. long. *Flowers* in pedunculate (6—12 mm. long)



umbellules, many together in short axillary or lateral tawny-pubescent bracteate racemes 5—6 mm. long, several such racemes together often forming dense cylindric clusters of flowers around the branchlets; umbellules when open 10—12 mm. broad in ♂, 8 mm. in ♀; involucre bracts 4—5, orbicular, concave, reflexed in flower; flowers in each umbellule 5—6; perianth-tube short, on a 2—3 mm. long villous pedicel; lobes usually 6, very variable in shape, from linear-oblong to elliptic or obovate, ciliate, glandular-punctate, 2—3 mm. long. *Stamens* in ♂ flowers normally 9, an outer row of 3 eglandular, a second row of 3 1—2-glandular, a 3rd row of 3 opposite the first biglandular, but sometimes there is a 4th row of 3 biglandular and occasionally a few more, the outer rows slightly longer than the inner, up to 4 mm. in all; glands large, reniform, stipitate, attached to the slender villous filaments near the base; upper anther-cells all introrse, lower lateral or extrorse; rudimentary ovary 0. *Staminodes* in ♀ flowers in similar number and arrangement, the outer rows clavate with slender villous filaments 2 mm. long, the inner subulate thick 1.5 mm. long, the glands very large. *Ovary* ovoid; style thick, slightly curved; stigma broad, peltate. *Fruit* ellipsoid, 7—10 mm. long, seated on the slightly enlarged perianth-tube 4 mm. broad, with somewhat reflexed entire margins; enlarged pedicel 7 mm. long hardly thickened; pericarp smooth, black; cotyledons hemispherical. Hook. f. Fl. Br. Ind. V. 162; Prain Beng. Plants 903; Brandis Ind. Trees 536; Koord. & Val. Bijdr. X. 147. *L. monopetala*, Pers. Syn. II. 4. *Tetranthera monopetala*, Roxb. Cor. Pl. II. 26, t. 148 and Fl. Ind. III. 821; Nees in Wall. Pl. As. Rar. II. 66 and Syst. Laur. 525; Blume Mus. Bot. Lugd.-Bat. I. 378; Meissn. in DC. Prodr. XV. 1. 189; Miq. Fl. Ind. Bat. I. 948; Brandis For. Fl. 380, t. 45; Kurz For. Fl. II. 299. *T. macrophylla*, Wall. Cat. 2549. *T. alnoides*, Miq. Pl. Jungh. 180 and Fl. Ind. Bat. l.c. *T. hexantha*, Sieb. Fl. Maurit. 92.

PENANG: *Maingay* K.D. 1277!; Government Hill, *Ourtis* 283!; Government Hill and Balik Pulau, *Ridley* 6371!, 7065!, 9731!, 10352!. PERAK: Gunong Pundo, *King's Collector* 8326! PAHANG: at Pulau Tawar, *Ridley* 2271!; at Sungei Telai, *Machado* 11553!; at Kwala Tembeling, *Ridley's Collector*! (these two with more glabrous involucre).—DISTRIB. Northern India, Burma, Java, China.

12. LITSEA CORDATA, Hook. f. in Fl. Br. Ind. V. 177 (1886). A spreading evergreen tree reaching 15 m. in height, occasionally 30 m. with a diameter of 90 cm. (Kunstler 8269); branchlets rather

slender, smooth, black when dry, the uppermost rusty-tomentose as are the innovations. *Leaves* membrano-chartaceous, alternate; broadly ovate or ovate-oblong, acute or acuminate at apex, cordate at base sometimes unequally; upper surface smooth, shining, glabrous except on the nerves, lower rusty-tomentose, dark reddish-brown when dry; 10—17 cm. long, 6—10 cm. broad; midrib slender above and channelled, stouter below; main nerves 10—14 pairs, impressed above, raised beneath, the lowest 1—2 pairs curved downwards and then up, the rest at 50°—70° with the midrib at first straight then curved to near the margin where they fade away in diminishing loops; transverse nervules prominent, straight or slightly curved, sometimes branched, enclosing the minutely areolate reticulation; petiole rather slender, 10—25 mm. long, often rugose. *Flowers* in umbellules on slender peduncles 7—10 mm. long in ♂, 4—5 mm. in ♀, in slender puberulous axillary erect or drooping racemes reaching to 16 cm. long in ♂, barely 10 cm. in ♀; rachis angled; raceme bracts small, ovate, tomentose, 1—2 mm. long, caducous; umbellules 7—8 mm. in diam. when open; involucre bracts 5, slightly puberulous without, glabrous within, the outer 3 orbicular concave, the inner 2 obovate and much smaller; flowers in each umbellule 6, on very short golden-villous pedicels; perianth tube short, long-pilose within, lobes 6, oblong, obtuse or acute, glabrous except for a few long pilose hairs on the back, ♂ 3 and ♀ 2 mm. long, gland-dotted, those of ♀ early deciduous. *Stamens* of ♂ flowers 12, those of the outer rows 3 mm. long with ovate anthers and slender filaments bearing long pilose hairs in tufts near the base, those of the inner rows similar but shorter with a pair of large oblong sessile glands a little above the bases of the filaments; rudimentary ovary ovoid, thickly pilose with twisted style and capitate stigma. *Staminodes* of ♀ flowers also normally 12, sometimes fewer in inner rows, those of the outer rows clavate about 1 mm. long, the filaments bearing a tuft of pilose golden hairs as in ♂, those of the inner rows subulate, scarcely shorter, with a pair of large oblong subsessile glands a little above the base. *Ovary* ovoid, apparently glabrous; style thick, curved; stigma peltate, lobed. *Fruit* oblong, acute, glossy dark red when fresh, black when dry, up to 2 cm. long, 9 mm. broad, seated on the slightly enlarged perianth-tube, which at first is somewhat cup-shaped enclosing the base of the fruit, afterwards slightly obconic, spreading and flattened, about 5 mm. in diam., the margins smooth; enlarged pedicel about 1 cm. long; pericarp smooth, thin; cotyledons semi-

oblong. *Tetranthera cordata*, Jack in M'Clelland's Calc. Journ. Nat. Hist. IV. 356; Walp. Ann. Bot. Syst. I. 578; Meissn. in DC. Prodr. XV. 1. 196. *T. cordifolia*, Meissn. l.c.

PERAK: at Assam Kumbong, Sungie Larut, Thaipeng, etc., Wray 2126!, 2462!, 2871!, 3045!; *Scortechini*!; road to Campar, Ridley 9597!; dense jungle on low ground and hills up to 180 m. alt. near Larut, King's Collector 3176!, 3962!, 5180!, 6529!, 8269!, 10824!. SELANGOR: at Kerling, Goodenough 10537!. MALACCA: Griffith 4298!; at Sungei Udang, Goodenough 1353!. JOHORE: at Kota Tinggyi, Ridley 4226!; at Bukit Murdon, Lake and Kelsall 4027!. SINGAPORE: at Kranji, Ridley's Collector 6743!; at Bukit Timah, Kunstler 353!—DISTRIB: Sumatra; Borneo (near Kuching, Sarawak, Haviland and Hose 1807!; at Rejang, Sibul, Haviland and Hose 3654 C!);

The flowers of the Borneo specimens are slightly larger than those from the Peninsula, but the specimens are better developed and the structure is the same.

13. *LITSEA CITRATA*, Blume Bijdr. 565 (1825). A deciduous (?) shrub or small tree reaching 10—12 m. in height with 15—20 cm. diameter of stem, all parts orange-scented; branchlets slender, smooth, nearly black when dry, leaf-buds naked, acuminate, tawny-puberulous. *Leaves* membranous; lanceolate, attenuately acuminate at apex, attenuate or cuneate or sometimes rounded at base; upper surface smooth, shining, glabrous, olivaceous or blackish, lower glaucous; 7—13 cm. long, 2—4.5 cm. broad; midrib slender, dark and prominent on the lower surface; main nerves 10—12 pairs at first at nearly 80° with the midrib then curving to and along the margin, secondary nerves rather prominent, transverse nervules and reticulation prominent on the upper surface when dry; petiole slender, 10—18 mm. long, glabrous. *Flowers* in axillary or lateral umbelliform racemes bearing on peduncles about 5 mm. long about 7 involucrate umbellules; involucre of 4 concave nearly glabrous bracts; flowers in each umbellule 5 on slender puberulous pedicels; perianth-tube short, lobes 6, oblong or obovate, ciliate, silky within, 2 mm. long, those of ♂ and ♀ flowers similar. *Stamens* of ♂ flowers 9 (occasionally up to 12), those of the first two rows eglandular with quadrate anthers and slender filaments sparsely villous as is the connective, 3 mm. long; those of the third row rather shorter, also with quadrate anthers and a pair of large sessile or subsessile reniform glands attached near the bases of the filaments; anther-

cells all introrse except the lower ones of inner row which are often lateral; rudimentary ovary conical, with slender style and small spreading stigma. *Staminodes* of ♀ flowers 9, those of the 1st and 2nd rows linear, villous, 1 mm. long, those of the 3rd row subulate, villous, with a pair of large semisagittate sessile glands above the base of the filaments. *Ovary* ovoid, glabrous, with short thick style and large peltate usually lobed stigma. *Fruit* small, globose, 5—6 mm. in diameter, seated on the very slightly enlarged flattened perianth-tube about 2 mm. broad; pedicel 5 mm. long; pericarp fleshy, glabrous, aromatic; cotyledons hemispherical. Hook. f. Fl. Br. Ind. V. 155; Koord. & Val. Bijdr. X. 142; Brandis Ind. Trees 535. *Tetranthera citrata*, Nees Syst. Laur. 560; Bl. Mus. Bot. Lugd.-Bat. I. 385; Miq. Fl. Ind. Bat. I. 958. *T. polyantha*, Wall. Cat. 2538; Nees in Wall. Pl. As. Rar. II. 67 and Syst. Laur. 545; Meissn. in DC. Prodr. XV. 1. 182 (excluding China as locality); Kurz For. Fl. II. 301.

PERAK: Thaiping Hills, 3000 ft., *Ridley* 11390! PAHANG: at Telom, *Ridley* 13780!.—DISTRIB. India (Eastern Himalaya, Assam, Khasia Hills, Manipur, usually above 5000 ft.), Upper Burma, Java (above 2000 ft.).

It is very difficult in poor specimens to distinguish this from *Lindera pipericarpa*.

14. *LITSEA PETIOLATA*, Hook. f. in Fl. Br. Ind. V. 171 (1886). A very large evergreen tree reaching to 30 or even 45 m. in height and to more than 1 m. in diameter of stem; branchlets moderately stout, grey-brown when dry, uppermost and innovations glabrous except the minutely puberulous grey ovate-lanceolate buds. *Leaves* chartaceous, alternate; elliptic or elliptic-oblong or -lanceolate, obtuse or obtusely acute or sometimes acuminate at apex, cuneate sometimes unequally at base; upper surface bright green with yellow ribs when fresh, dull or shining reddish-brown when dry, glabrous, lower also glabrous, paler reddish-brown; 7—15 cm. long, 3—8 cm. broad; midrib impressed above; main nerves 5—8 pairs, slender, impressed above, curving to the margin; transverse nervules many, sub-parallel, not prominent; reticulation areolate; petiole slender, 1.5—2 cm. long. *Flowers* in umbellules on slender peduncles 5 to 10 mm. long in ♂, shorter and stouter in ♀, in rather dense lateral puberulous bracteate racemes usually 5—7 mm. long, forming clusters of up to 12; umbellules about 8 mm. in diam. in ♂, 5 mm.

in ♀ ; involucre bracts 5, glabrous or only minutely pubescent, thin, orbicular, concave, reflexed ; flowers in each umbellule 5—7, pedicels stout, pubescent ; perianth-tube short, lobes 6, linear-oblong, membranous, ciliate and laxly villous, 3 mm. long. *Stamens* in ♂ flowers 9, those of the outer 2 rows 5—7 mm. long with oblong anthers and filiform villous filaments, those of the inner row rather shorter with smaller anthers and a pair of small reniform stipitate glands at the base ; rudimentary ovary very small with long villous style and capitate stigma. *Staminodes* in ♀ flowers normally 9, those of the 2 outer rows subulate clavate 2—2.5 mm. long with hispid filaments, those of the 3rd row short clavate glabrous with a pair of large reniform shortly stipitate glands. *Ovary* globose, glabrous ; style thick, 3 mm. long ; stigma large, discoid. *Fruit* nearly globose, 6—7 mm. in diameter, seated on the very slightly enlarged flattened perianth-tube, about 3 mm. in diam., the margins sinuate somewhat reflexed ; pedicel stout, clavate, 5—7 mm. long ; pericarp smooth, rugose when dry.

PERAK : in open jungle on low hills up to 250 m. alt., *King's Collector* 430 !, 4460 !, 7759 !, 7761 ! ; *Scortechini* !. SELANGOR : at Kwala Lumpur, *Ridley's Collector* 4699 !. MALACCA : *Mainingay* K.D. 1265 ! SINGAPORE : in Garden, Garden jungle, etc., *Ridley* 56 !, 3368 !, 6821 !, 10640 !, 10838 !, 11337 !, 11839 ! ; at Galang, *Baker* 3033 !. Vern. 'Poko Parawas'.

15. *LITSEA BRACHYSTACHYA*, Boerl. Handl. Fl. Ned. Ind. III. 143 (1900). A spreading evergreen tree reaching a height of 15—18 m. and up to 90 cm. in diam. of stem ; branchlets rather slender, smooth, nearly black when dry, angled, channelled decurrently from below the bases of the nodes, uppermost and innovations minutely grey-puberulous. *Leaves* chartaceous or subcoriaceous, alternate, glabrous ; elliptic or elliptic-ovate, obtusely acuminate at apex, acute or rounded often unequally at base ; upper surface shining, bright green when fresh, dark brown when dry, lower bluish green when fresh, brown when dry ; margins slightly recurved ; 10—14 cm. long, 5—7 cm. broad ; midrib slender, impressed above, prominently raised beneath ; main nerves 7—9 pairs, rather irregular, impressed above, at from 50° to 60° or sometimes 70° with the midrib, curved to join the margin ; transverse nervules rather distant and not prominent, straight or curved, enclosing the netted and rather obscure reticulation ; petiole slender, 15—25 mm. long, channelled above. *Flowers* in umbellules or slender peduncles up to 6 or even 10 mm.

long in panicles of racemes reaching to 4 sometimes to 10 cm. in length; rhachis angled, black when dry, minutely puberulous or glabrescent; raceme bracts minute, grey-puberulous, caducous; umbellules when open 5 mm. in diam.; involucre bracts 4—5, glabrous, reflexed in flower, the outer orbicular, the inner ovate or oblong; flowers in each umbellule 5—6, very small, on short villous pedicels; perianth-tube glabrous within except for tufts of long hair at the mouth; lobes 6 or fewer, some occasionally wanting, some merely linear, normally lanceolate, acuminate, villous on the back, 1—1.5 mm. long, those in ♀ flowers early deciduous in a ring. *Stamens* of ♂ flowers usually 9, the 6 of the outer rows 2 mm. long with subquadrate anthers and slender filaments long pilose at the base, the 3 of the inner row shorter and with a pair of shortly stipitate reniform glands near the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers 9, those of the outer rows 6 clavate, the filaments long-pilose, those of the inner row 3 subulate with a pair of large nearly sessile glands at their middle. *Ovary* globose, glabrous; style short; stigma large, peltate, lobed. *Fruit* globose or slightly ellipsoid, 8 mm. long, 7 mm. in diam., seated on the slightly enlarged obconic perianth-tube 3 mm. in diam.; enlarged pedicel 5 mm. long; pericarp thin, smooth; cotyledons hemispheric. Koord. & Val. Bijdr. X. 156. *Tetranthera brachystachya*, Bl. Mus. Bot. Lugd.-Bat. i. 384 (1851); Meissn. l. c. 196. *T. lucida*, Hassk. Cat. Hort. Bogor. 90 (1844) and Pl. Jav. Rar. 216; Miq. Fl. Ind. Bat. I. 1, 956 excl. syn.; Meissn. in DC. Prodr. XV. 1, 197.

PERAK: at Matang Jambu, etc., Wray 2518! 2886!; forests of Larut and Ulu Buvong at 120—200 m. alt., King's Collector 6855, 10528!—DISTRIB. Java.

The description of the fruit is taken from Buitenzorg specimens. Koord. and Val. consider that Wight's t. 1836 is probably intended to represent this species, but a comparison of the specimen of Wight's in Herb. Kew does not bear out this suggestion. Wight's t. 1836 probably represents *L. glabrata*, Wall. *Litsea lucida*, Bl. Bijdr. 961, is a *Lindera*.

16. *LITSEA ANGULATA*, Blume Bijdr. 563 (1825). An evergreen tree reaching 12—17 m. in height and 40—50 cm. in diam. of stem; branchlets moderately stout, grey, blackish-scurfy and lenticellate, uppermost angular, nearly black when dry, minutely puberulous; leaf buds lanceolate, grey-puberulous. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong or -obovate, obtusely acute or acuminate at apex, attenuate or cuneate at base; upper surface olive-brown, shining,



glabrous; lower dark reddish brown, minutely but sparsely puberulous when young, afterwards glabrous; 10—20 cm. long, 4—6 cm. broad; midrib thick, impressed and sometimes keeled above, raised beneath; main nerves prominent, 7—12 pairs, usually 10, regular, parallel, impressed above, bisulcate beneath, leaving the midrib at from 65°—70° and curving rather obliquely to the margin where they end; transverse nervules obscure, very slender, numerous and nearly straight, sometimes branched, enclosing the very minute obscure reticulation; petiole stout, 10—25 mm. long, black. *Flowers* in umbellules on slender grey-pubescent peduncles 5—7 mm. long, in axillary or lateral short pubescent racemes reaching (buds only) 1 cm. in length with about 6 flowers; involucre bracts 5, the 2 outer coriaceous, glabrous, orbicular, concave, the rest membranous and ovate, the innermost fimbriate and puberulous without; flowers in each umbellule 6, subsessile; perianth lobes 6—8, irregular in shape, sometimes alternately ovate-acute and oblong-obtuse, densely golden-villous without. *Stamens* in ♂ flowers (from bud only) 12—16, usually 12, glabrous, those of inner rows with a pair of large angular glands near the bases of the filaments. *Staminodes* of ♀ flowers 9, the 3 inner short and furnished with large quite adnate glands (Koorders & Valetton). *Fruit* glossy, dark red, ovate-oblong, 2 cm. long, 1 cm. in diam., the tip obtusely acute, seated on the flattened enlarged perianth-tube with undulate margins 6 mm. in diam.; enlarged pedicel clavate, flattened, 14—17 mm. long; pericarp when fresh speckled with white, the tip green (Kunstler) when dry nearly black. Koord. & Val. Bijdr. X. 158. *L. Reinwardtii*, Bl. M.S. fide Meissn. *Tetranthera angulata*, Nees Syst. Laur. 544; Blume Mus. Bot. Lugd.-Bat. I. 384; Miq. Fl. Ind. Bat. I. 1. 956; Meissn. in DC. Prodr. XV. 1. 197. *T. pseudo-angulata*, Bl. p. c. I. 385.

PERAK: on low ground at Larut, *King's Collector* 5350!, 6683!.  
 SELANGOR: at Gua Batu, *Ridley* 8505!—DISTRIB. Java.

I believe the identification to be correct: unfortunately there are only leaf specimens available for comparison in the Kew and Calcutta Herbaria. Koorders and Valetton describe the drupes as depressed-globose.

17. *LITSEA SPATHACEA*, Gamble in Kew Bull. 358 (1910). A shrub or small shrubby tree scarcely reaching 6 m. in height and 5—8 cm. diam. of stem; branchlets rather stout, pale brown, sulcate or striate, lenticellate, innovations puberulous; buds lanceolate, leafy. *Leaves* submembranous, alternate, very variable; elliptic-oblong or



-oblanceolate or -obovate, rounded or acute or acuminate sometimes even cuspidate at apex, cuneate or attenuate at base; upper surface dull, olive-green, glabrous, lower glaucous or bluish-green, rarely reddish, also glabrous; 8—24 cm. long, 5—10 cm. broad; midrib pale, slender, impressed above, prominent beneath; main nerves 9 to 12, pale, curving upwards to join in loops near the margin; transverse nervules few but nearly straight and prominent, shining, conspicuous on the under surface, the smaller reticulations very evident on the upper surface when dry; petiole 5—20 mm. long, bordered above by the decurrent margins of the blade. *Flowers* in sessile or very shortly peduncled umbellules in very short few- (1—3-) flowered long-bracteate racemes axillary or lateral; bracts subulate, 3—5 mm. long; umbellules with 6 ovate-orbicular concave involucreal bracts, the inner 3 smaller than the 3 outer, densely tomentose without, glabrous within, 5—7 mm. long, ♂ and ♀ nearly equal in size; flowers in each umbellule usually 6; perianth-tube short (1—1.5 mm.) in ♂, longer (3 mm.) in ♀; lobes 6, ovate, acute in ♂, oblong in ♀, ciliate, 1-nerved, 3 mm. long, glabrous or nearly so within. *Stamens* in ♂ flowers 9—12 in 4 rows, most (usually 6) of outer rows eglandular with 6 of inner rows shorter and biglandular, but often 3 only in inner row biglandular; outer rows 4 mm. long with small ovate acute anthers and very slender glabrous filaments, inner 2.5 mm. long with smaller anthers and shorter filaments and a pair of large sessile or shortly stipitate glands at their bases; rudimentary ovary ovate, very small with thick often bent style and peltate stigma. *Staminodes* of ♀ flowers as the stamens of the ♂ the outer ones clavate on capillary stalks 3 mm. long, the inner similar but 1—5 mm. long and with a pair of oblong glands at the base. *Ovary* ovoid with thick fleshy geniculate style and peltate slightly lobed stigma. *Fruit* ovoid, apiculate, 12—15 mm. long, 8—10 mm. broad, seated on the enlarged persistent but thin chartaceous perianth-tube which is 12 mm. in diam. bearing the persistent perianth lobes and often cleft in 2—5 segments; pericarp thin, glabrous; cotyledons semi-ovoid, fleshy.

PERAK: at Relan Tujor, Sungie Larut and Maxwell's hill, Wray 2198!, 2286!, 2755!; at Maxwell's hill, *Scortechini* 1410!; among rocks, in dense forest and up to 1000 m. alt., *King's Collector* 3493!, 4971!, 5130!, 5280!; Maxwell's hill, *Ridley*! SELANGOR: at Kwala Lumpur, *Curtis* 2371!

Var. *tomentosa*, Gamble. *Leaves* more obovate, rusty-pubescent beneath as are the upper branchlets and buds.

PERAK: *Scortechini* 1289!

18. *LITSEA MAGNIFICA*, Gamble. A small tree, bark smooth, pale, thin; branchlets moderately stout, pale brown, uppermost angular rusty-pubescent; buds lanceolate, hardly perulate. *Leaves* pergamaceous, more or less crowded towards the ends of the branchlets; oblanceolate, rounded and very shortly acuminate at apex, very long and narrowly-cuneate at base; upper surface dull, olive-green when dry, glabrous except the midrib; lower surface paler, minutely grey-puberulous or glabrous except on the nerves; 23—43 cm. long, 6—10 cm. broad; midrib stout, flat or impressed above, very prominent beneath; main nerves 15 to 20 at about 50° with the midrib, slightly curved to the margin, impressed above, raised beneath; secondary nerves few and short; transverse nervules irregular and obscure; reticulation obscurely netted; petiole stout, 1 cm. long, sometimes 0. *Flowers* in long- (about 2 cm.) peduncled umbellules in very short thick woody racemes each bearing about 12 and about 7 mm. long, the racemes forming globose clusters 7—8 cm. broad on thick branches below the leaves; umbellules with 6 orbicular concave involucre bracts, densely grey-pubescent without, glabrous within, ♂ umbellules about 2 cm. in diam. when open, ♀ much smaller; flowers in each umbellule 7—9 in ♂, about 5 in ♀; perianth-tube funnel-shaped, 2—3 mm. long; perianth-lobes usually 6, oblong, ciliate, glandular, 3-nerved, 5—6 mm. long in ♂, 4 in ♀. *Stamens* of ♂ flowers 9 to 12, usually 12 in 4 rows, those of the two outer rows 7—9 mm. long, the filaments very slender and villous, the anthers 3·5—4 mm. long, acuminate, the upper cells oblong introrse, the lower overlapping the upper and lateral; those of the two inner rows 5—6 mm. long, similar but with the anthers shorter, and bearing at the base of the filaments a pair of stout pyriform sessile or subsessile glands under 1 mm. long; rudimentary ovary ovoid with long (4—5 mm.) style and spreading 2—3-fid stigma. *Staminodes* of ♀ flowers usually 12, sometimes more and rather variable, those of the 2 outer rows linear-subulate, 4—5 mm. long, slightly villous near the base, those of the 2 inner rows shorter and rather stouter 3—4 mm. long and bearing a pair of stout basal glands as in the ♂. *Ovary* ovoid; style 7 mm. long, gradually expanding upwards; stigma peltate, lobed, 2·5 mm. in diam. at top. *Fruit* (unripe) ovoid, subtruncate, apiculate, 10 mm. long, 7 mm. broad, seated on

the cup-shaped enlarged perianth-tube, smooth on the margins or with the remains of the perianth-lobes and staminodes, pubescent without, 5 mm. high and 8 mm. in diam.; pericarp thin, smooth, dotted. *Lepidadenia magnifica*, Miq. Fl. Ind. Bat. I. 936. *Cylichodaphne magnifica*, Meissn. in DC. Prodr. XV. 1. 203.

PENANG: Waterfall gardens, *Ridley* 10770!. MALACCA: at Nyalas, *Derry* 1017!. (Vern. 'Madang Telon'); *Ridley's Collector* 448! (Vern. 'Madang Kuraing').—DISTRIB. Sumatra (*Teysmann* 1011 from Batang baroes, west coast!).

*Teysmann's* specimen in Herb. Calc. has leaves only but all the specimens enumerated agree with it.

Var. *pahangensis*, Gamble. Leaves larger, up to 12 cm. broad, more coriaceous, shining above reddish beneath when dry; main nerves less oblique, at about 70° with the midrib, deeply impressed, up to 25; petiole up to 2 cm. long, very stout.

PAHANG: at Pulau Chenkel and Kwala Tenok, *Ridley* 2271! etc., (Vern. 'Thadang Kunyit').

The ♂ flowers of this variety exactly agree with those of *Derry* 1017. The ♀ flowers have been used in the description of the species.

19. *LITSEA RIDLEYI*, Gamble in Kew Bull. 317 (1910). A tree; branchlets moderately stout, dark brown, uppermost minutely rusty-puberulous as are the lanceolate buds and the inflorescence. Leaves chartaceous, alternate; elliptic-oblong or -lanceolate, obtuse or acute or acuminate, often mucronate at apex, long attenuate at base; upper surface smooth, shining, glabrous except the rusty-puberulous midrib, minutely areolate-reticulate; lower paler or even sub-glaucous, younger slightly puberulous, later glabrescent, the nerves pubescent; margins recurved; 10—25 cm. long, 4—8 cm. broad; midrib slender, scarcely raised above, prominent beneath; main nerves 7—10 pairs, often irregular or branched, impressed above, raised beneath, starting at about 50° with the midrib and curving upwards to and along the margin, the uppermost 2—3 pairs nearly rejoining the midrib at its apex; transverse nervules very irregular, prominent, enclosing a faint areolate reticulation; petiole stout, flattened above, slightly rugose, nearly black, 1.5—2.5 cm. long. Flowers in short (up to 12 mm.) slender-peduncled umbellules in very short axillary or lateral racemes of 6—12, the racemes densely rusty-villous about 5 mm. long; umbellules 8—10 mm. broad when open; involucre bracts 4, ovate-oblong, concave, 4 mm. long; flowers in

each umbellule 4—6; perianth-tube short, lobes 6, oblong, villous, 2—3 mm. long. *Stamens* in ♂ flowers usually 9 (sometimes but less often up to 12), those of the outer rows 3 mm. long with sub-quadrate anthers and slender villous filaments, those of the inner rows shorter and with a pair of subsessile glands attached a little above the bases of the filaments; rudimentary ovary conical, with slender style and bifid stigma. *Staminodes* of ♀ flowers usually 12 (sometimes 9), those of the outer rows clavate with villous filaments 1—2 mm. long, those of the inner rows shorter and with a pair of rather large glands a little above the base. *Ovary* ovoid, glabrous; style curved; stigma subcapitate, bifid. *Fruit* nearly globose, 15 mm. in diam., seated on the enlarged, at first nearly closed, later hemispheric, at length obconical rugose perianth-tube about 6 mm. high, 8—10 mm. in diam. at the crenulate mouth and bearing the remains of the lobes and staminodes; pedicel short, slightly enlarged only; pericarp smooth, somewhat shining and wrinkled when dry.

SINGAPORE: at Changi, *Ridley* 3803!; at Reservoir Road, *Ridley* 5101!; at Bukit Mandai, *Ridley* 3836!, 4701!, 5064!, 5852!, 10833!; at Holland Road, *Hullett*; at plant house, *Caniley* 193!

This species is not unlike *L. Wallichii*, Hook. f., but differs in being pubescent and having leaves not prominently areolate-reticulate.

20. *LITSEA PENANGIANA*, Hook. f. in Fl. Br. Ind. V. 171 (1886). A small evergreen tree, reaching 7—9 metres in height and 15 cm. diameter of stem; branchlets pale brown densely softly rusty-tomentose as are the innovations, petioles and inflorescence; buds ovoid. *Leaves* coriaceous, alternate; elliptic-oblong, obtuse or shortly acute at apex, cuneate at base; upper surface dark-green when fresh, olive-brown when dry, glabrous, somewhat shining; lower pale bluish-grey when fresh, cinnameous when dry, at first minutely soft tomentose especially on the nerves, afterwards glabrous; 10—22 cm. long, 4—7 cm. broad; midrib stout, slightly channelled above; main nerves 8—10 pairs curving upwards to and along the margin, transverse nervules and reticulation faint on lower, minutely areolate on upper surface; petiole stout, 1—2.5 cm. long. *Flowers* in sessile or very shortly (up to 5 mm.) peduncled umbellules in very short small racemose axillary or lateral clusters of 3—4; involucre bracts 4, densely tomentose, ovate, concave; flowers in each umbellule 4—6; pedicels very short or 0; perianth-tube stout, 2 mm. long, villous within; lobes 6, oblong, obtuse, ciliate, glabrous within, tawny-villous without, 2—3 mm. long, erect or

spreading in ♂, more spreading in ♀. *Stamens* of ♂ flowers 12, in 4 rows, those of the outer row longest, 3 mm. long, eglandular, those of the 2nd 2.5 mm. long eglandular, those of the 3rd and 4th 2—2.5 mm. long with a pair of large reniform stipitate glands near the base; anthers ovoid, filaments of outer rows villous, of inner nearly glabrous, cells of 4th row anthers sometimes 2 only, all introrse; rudimentary ovary slender with slender style and bifid stigma. *Staminodes* of ♀ flowers 12, those of 2 outer rows slenderly clavate, 2 mm. long with villous filaments, those of inner rows similar but shorter and with a pair of large stipitate glands near the base. *Ovary* ovoid; style thick, curved; stigma peltate, bifid. *Fruit* ellipsoid, apiculate, 8—12 mm. long, 7—8 mm. broad, seated on a thick cup formed by the enlarged perianth-tube, cup at first nearly enclosing the fruit, afterwards hemispheric 10 mm. in diameter, the outside rugose, the margin crenulate with remains of the perianthlobes and staminodes; enlarged pedicel very short, thick; pericarp shining, yellowish when dry.

PENANG: *Phillips*; on Government Hill, Maingay K.D. 1258/2!; at Moniots' road, 600 m. alt., *Curtis* 1587!, 2159!; at 550 m., *King's Collector* 1580!. PERAK: at lower camp, Gunong Batu Pateh, *Wray* 921!, 969!, 1081!, 1188!; *Scortechini* 369!; at 300 to 600 m. alt., *King's Collector* 8067!

The leaves and fruit of this species resemble those of *L. Griffithii*, but the leaves are alternate and not opposite and the flowers are different. Were it not for the remarks made by Sir Jos. Hooker in the Fl. Br. Ind. I should have been disposed to refer this species to *Tetranthera accedens*, Blume.

21. LITSEA CASTANEA, Hook. f. in Fl. Br. Ind. V. 171 (1886). A large tree reaching 30 or 40 m. in height and a great girth of stem; branchlets rather stout, dark grey-brown, hoary, lenticellate, uppermost minutely greyish-tawny-puberulous as are the linear lanceolate buds the petioles and inflorescence. *Leaves* chartaceous, alternate; elliptic, elliptic-ovate or -obovate, sometimes nearly orbicular, obtuse or emarginate at apex, rounded sometimes unequally at base; upper surface dark green when fresh, shining and dark reddish-brown when dry, lower paler and redder, both glabrous except the nerves, sometimes puberulous beneath and areolate reticulate; margins recurved; 7—22 cm. long, 5—10 cm. broad; midrib stout, deeply impressed above, much raised beneath; main nerves 8—16 pairs, deeply impressed above, at an angle of about 60° with the midrib at first nearly straight then curved to near the

margin where they, at any rate the upper ones, meet in loops strongly marked beneath; transverse nervules many, prominent, slightly arched; reticulation minutely netted; petiole fairly stout, 1—2.5 cm. long, channelled above. *Flowers* in umbellules on rather stout peduncles 8—12 cm. long in short axillary or lateral 6—8 mm. long racemes of about 6—8 each; raceme bracts ovate deciduous; umbellules when open 10—12 mm. broad ( $\sigma$  only); involueral bracts 4.5, ovate or ovate-orbicular, concave, white-tomentose, reflexed in flower; flowers in each umbellule 4—6; perianth-tube 3 mm. long, lobes 6—8, spreading or reflexed, variable but usually oblong-spathulate, densely villous without, glabrous within, 5 mm. long. *Stamens* in  $\sigma$  flowers 12—16, normally 12, those of outer rows 6—8 mm. long with ovate anthers and very slender sparsely villous filaments, those of inner rows shorter with subquadrate anthers and a pair of round long stipitate glands at about one-third of the length of the filaments; rudimentary ovary 0. *Staminodes* in  $\varphi$  flowers (bud only) 9—15, those of the outer rows clavate with villous filaments, those of the inner rows subulate-clavate with a pair of reniform stipitate glands near the base. *Ovary* globose, included in the speedily circumsciss perianth-tube; style thick, curved, glabrous; stigma large, conical. *Fruit* ovoid, to cylindric-ovoid 12 to 20 mm. long, 8 to 10 mm. broad, the base enclosed in the hemispheric cup-shaped enlarged perianth-tube 7—8 mm. high and 12 mm. in diam. at the circular mouth, the outside slightly rough, slightly puberulous; pedicel rather slender, slightly flattened, 10 mm. long; pericarp smooth, shining, yellowish-brown when dry.

PERAK: at Sungie Larut and Kota, *Wray* 2353!, 2867!, 3119!; in mixed forest about Larut up to 450 m. alt., *King's Collector* 3296!, 3509!, 4937!, 6497!, 10283!, 10926! SELANGOR: at Kwala Lumpur, *Ridley's Collector*!; *Burn-Murdoch* (*Ridley* 13204!) MALACCA: *Maingay* K.D. 1239!; at Bukit Bruang, *Goodenough* 1422!; at Brisu, *Derry* 1047!.

22. *LITSEA QUERCINA*, Gamble in Kew Bull. 318 (1910). A tree; branchlets greyish-brown, rather slender, uppermost grey-pubescent as are the innovations and the petioles and midrib of the leaves. *Leaves* coriaceous, alternate, areolate-reticulate; elliptic or elliptic-ovate, obtuse and mucronate sometimes emarginate at apex, rounded at base; both surfaces dark greyish-brown when dry, upper shining, glabrous except on the nerves, lower minutely puberulous



to nearly glabrous; 6—8 cm. long, 3—3.5 cm. broad; midrib slender but prominent, pubescent, deeply impressed above; main nerves 7—9 pairs, impressed above, starting at about 70° with the midrib and curved to near the margin; transverse nervules faint; areolate reticulation prominent on both surfaces under the lens; petiole 8—10 mm. long, rather slender. *Flowers* in umbellules on peduncles 6—8 mm. long on very short lateral racemes. *Fruit* ellipsoid-oblong, 2 cm. long, 1 cm. in diam., seated on the cup-shaped enlarged perianth-tube, the cup black when dry, dull, 7 mm. high, 9 m. in diam. at the sharp circular margin; enlarged pedicel very stout, 4 mm. long; pericarp smooth, shining, yellowish and wrinkled when dry.

PERAK: at lower camp, Gunong Batu Pateh, Wray 1174!

Very near *L. castanea*, but has much smaller thicker leaves, not red when dry, and with fewer main nerves.

23. *LITSEA CYLINDROCARPA*, Gamble in Kew Bull. 318 (1910). A spreading evergreen tree reaching 30 or 40 m. in height with a diam. of 90—120 cm. of stem; branchlets moderately stout, greyish, smooth, uppermost angular, minutely grey-puberulous as are the lanceolate buds and the inflorescence. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong or -obovate, obtusely acute or rounded and very shortly apiculate or simply mucronate at apex, cuneate or attenuate at base; dark green and shining above when fresh, dull and brown and glabrous when dry except the prominently impressed midrib and main nerves, pale brown to glaucous and very minutely puberulous beneath; margins recurved; 9—18 cm. long, 4—9 cm. broad; midrib slender; main nerves 6—12 pairs, prominent, parallel, deeply impressed, starting at about 70° with the midrib and only slightly curving till close to the margin; transverse nervules many, straight, parallel but often hardly visible; reticulation not visible; petiole 10—25 mm. long, channelled and puberulous above. *Flowers* in rather long- (up to 1 cm.) pedunculate umbellules in axillary or lateral grey-pubescent racemes or clusters of racemes about 15—17 mm. long; raceme bracts ovate, acute, deciduous; involucre bracts ovate-orbicular, 4—5 mm. long, concave, glabrous within, at length spreading; flowers in each umbellule 5; pedicels short, tawny-villous; perianth-lobes oblong acute, very membranous, villous, 2—3 mm. long. *Stamens* of ♂ flowers very variable, 8—13, normally 9, those of the outer rows up to 5 mm. long with ovate anthers and slender villous filaments, sometimes with 1 or 2 glands



at the base; those of the inner rows shorter and biglandular, the glands rather small; rudimentary ovary rounded, villous; style slender; stigma oblique. *Staminodes* of ♀ flowers not known. *Fruit* cylindric-oblong, 2 cm. long, 7—9 mm. broad, obtuse at apex, seated on the cup-shaped rugose puberulous enlarged perianth-tube 5 mm. high, 7 mm. broad at the mouth; pedicel thick, flattened, 5 mm. long; pericarp red when ripe, rugose when dry; cotyledons oblong, base acute.

PENANG: at Batu Etam, 500 m., *Curtis* 787!. PROVINCE WELLESLEY: at Nibong Tibal, *Curtis* 3473!; at Krian, *Ridley* 9388!. PERAK: in dense jungle on low ground up to 30 m. alt., *King's Collector* 5500!, 5568!, 6207!, 6673!; at Bruas, *Burn-Murdoch* 211.—DISTRIB. Java, Borneo (base of Matang, *Ridley* 11673!; near Kuching, *Haviland* 3297!).

24. *LITSEA WRAYI*, Gamble in Kew Bull. 319 (1910). An ever-green tree reaching 20—25 m. in height and up to 60 cm. in diameter of stem; branchlets slender, greyish-brown, uppermost darker, angled, slightly puberulous; leaf-buds lanceolate, grey-puberulous. *Leaves* chartaceous, alternate-elliptic; oblong, or oblong-lanceolate or -oblanceolate, acuminate at apex, long attenuate at base or more rarely acute; upper surface smooth, shining, glabrous, dark-brown, lower paler and reddish, glabrous or the youngest very slightly puberulous; margins slightly recurved, thickened; 10—17 cm. long, 3—5 cm. broad; midrib slender, slightly impressed above, raised beneath; main nerves 10—13 pairs, hardly impressed above, leaving the midrib at about 60° and curving at once obliquely upwards to and along the margin, the upper ones joining in loops; transverse nervules slender, irregular, often branched, enclosing the areolate reticulation; petiole slender, 15—25 mm. long, the upper half bordered by the decurrent margins of the blade. *Flowers* (buds only) in umbellules on slender villous or sub-glabrous peduncles 4—6 mm. long, single or fascicled or in very short (5 mm.) puberulous racemes, axillary or lateral on the upper branchlets; raceme bracts ovate, grey-puberulous, caducous; involucrel bracts 4—5, villous without, glabrous within, the fifth when present obovate, the rest orbicular concave; flowers in each umbellule 5—6; perianth-lobes 6, villous without, oblong, obtuse or acute usually alternately. *Stamens* in ♂ flowers 12, glabrous, those of the outer rows with acute anthers, those of the inner rows obtuse and with a pair of sessile glands halfway up the filaments; rudi-

mentary ovary ovate with short style and cleft stigma. *Staminodes* of ♀ flowers also 12, glabrous, those of the outer rows clavate, those of the inner rows subulate with a pair of large sessile glands above the base. *Ovary* ovoid; style thick, curved; stigma capitate. *Fruit* globose with slightly conical blunt apex, 10 mm. in diam. seated on the enlarged spotted perianth-tube; cupule when young nearly globose enclosing the fruit with only a very small orifice, at length obconical enclosing only the lower half of the fruit, 8 mm. high and 12 mm. in diameter at the mouth, margin smooth; enlarged pedicel thick, slightly flattened, 4 mm. long; pericarp waxy white when fresh, yellowish when dry.

PERAK: at Waterfall Hill, *Wray* 1853!, 4036!; *Scortechini*!; in hill forests near Larut at 250—450 m. alt., *King's Collector* 6908!, 7569!.

25. *LITSEA SINGAPORENSIS*, Gamble in Kew Bull. 358 (1910). A tree (?), branchlets moderately stout, pale brown, glabrous; buds lanceolate, pubescent. *Leaves* coriaceous, alternate; oblong-lanceolate or -oblanceolate, obtuse or obtusely acute at apex, long-cuneately narrowed at base; margins recurved; upper surface smooth, shining, areolately reticulate, glabrous, pale brown when dry, lower also smooth and glabrous and lighter in colour; 15—30 cm. long, 4—7 cm. broad; midrib stout, flat or slightly raised above, raised beneath; main nerves 6—12 pairs, obscure and slightly impressed above, prominent beneath and conspicuous, curved to and along the margin; transverse nervules faint; reticulation areolate, fairly prominent on upper surface; petiole stout, rugose, 1.5—2 cm. long. *Flowers* in puberulous pedunculate (up to 13 mm.) umbellules in axillary or lateral thick racemes of about 1—4 and 7 mm. long; involucral bracts 4, thin, orbicular, concave; flowers in each umbellule 5, on thick short pedicels; perianth-tube short, lobes spatulate, rusty-villous without. *Stamens* in ♂ flowers 12, those of the two inner rows biglandular (buds only available); staminodes of ♀ flowers not seen. *Fruit* depressed globose, apiculate, 15 mm. in diam., seated on a shallow rather thin hemispheric cupule 7 mm. high, 16 mm. broad; cupule broadening with age, rugose or pustulate without, margin smooth; enlarged pedicel short, 6—7 mm. long, stout; pericarp smooth, pale yellowish or greenish when dry.

SINGAPORE: at Bukit Timah, Toas, in Garden jungle and

Botanic Garden, *Ridley* 2118!, 3372!, 3894!, 4135!, 4826!, 5965!, 5736!; at Tanglin, *Hullett* 5738!—DISTRIB. Borneo, Bongaya river, *Ridley* 9075!

26. *LITSEA PERAKENSIS*, Gamble in Kew Bull. 359 (1910). A tree reaching 20 or more metres in height and 50 cm. in diam. of stem; branchlets nearly black when dry, striate, glabrous. *Leaves* sub-coriaceous, alternate; oblong, oblong-obovate or -oblanceolate, obtuse acute or acuminate at apex, attenuate at base; dark green above when fresh, olive-brown and shining when dry, bluish green beneath when fresh, sub-glaucous when dry, glabrous on both surfaces; margins recurved; 15—30 cm. long, 5—8 cm. broad; midrib stout, reddish, scarcely raised above, prominent beneath; main nerves 10—12 pairs, somewhat irregularly parallel, starting at about 50° with the midrib and curved gradually to and along the margin, the upper few looped so as nearly to rejoin the midrib at its tip; transverse nervules few, faint as is the reticulation; petiole stout, 1.5—3 cm. long, glabrous. *Flowers* in slenderly-peduncled (8—10 mm. long) umbellules in short axillary lateral or sometimes sub-terminal glabrous or minutely puberulous racemes about 8 mm. long; raceme bracts lanceolate, acuminate; umbellules (♂ only) up to 10 mm. broad when open; involucre bracts 4, orbicular, concave, glabrous within, 3—4 mm. in diam.; flowers in each umbellule 5; pedicels 2—3 mm. long; perianth-lobes oblong, obtuse or acute, ciliate at the tips, 3 mm. long. *Stamens* of ♂ flowers 9—12, usually 12, those of the outer rows 5—6 mm. long with obovate anthers and slender filaments slightly villous at base, those of the inner rows shorter with smaller anthers and a pair of rounded shortly stipitate glands near the base; lower anther-cells all lateral; rudimentary ovary short, with thick glabrous style and capitate stigma. *Staminodes* of ♀ flowers not known. *Fruit* glossy with white spots when fresh, yellowish when dry, globose, 1 cm. in diam., apiculate, seated on the shallow cup-shaped enlarged perianth-tube 5 mm. high and 10 mm. in diam. at the mouth; the cup and its very thick somewhat flattened 8—10 mm. long pedicel roughly tubercular.

PERAK: at Larut and Gopong up to 250 m. alt., *King's Collector* 5114!, 6069!, 6085!. JOHORE: at Sungei Telang, *Ridley* 13233!. SINGAPORE: at Bukit Timah, *Ridley* 14135!.

Kunstler describes this as a magnificent and rare tree.

27. *LITSEA PUSTULATA*, Gamble in Kew Bull. 359 (1910) A small or moderate-sized evergreen tree reaching 12 to 18 m. in height and 25—37 cm. in diam. of stem; branchlets stout with large pith, pale brown, smooth, striate when dry, uppermost slightly puberulous. *Leaves* subcoriaceous, alternate; elliptic-oblong or slightly obovate, rounded and with a short acumen at apex, broadly attenuate to rounded at base; upper surface shining, glabrous, lower bluish-green or slate-coloured when fresh, subglaucous when dry; margins recurved; 18—35 cm. long, 8—14 cm. broad; midrib stout, flat above, raised beneath; main nerves 8—12 pairs, slightly impressed above, starting at from 50°—60° with the midrib and curving upwards to and along the margin, the uppermost nearly reaching the apex; transverse nervules many, faint, arched, enclosing the obscure areolate reticulation; petiole stout, 2—3 cm. long. *Flowers* in umbellules in short axillary or lateral racemes about 1 cm. long; rest not known. *Fruit* globose, slightly depressed, 15 mm. in diam., seated on the shallowly obconic patelliform enlarged very rugose spotted and pustulate perianth-tube, when young this is globose with a very small orifice and enclosing the fruit, later on it is hemispheric, finally patelliform 5—6 cm. long 12 cm. in diam., margin smooth; enlarged pedicel thick, also rugose and pustular, flattened, 8—12 mm. long; pericarp smooth, yellowish when dry.

PERAK: dense forests near Larut up to 250 m. alt., *King's Collector* 2544!, 3418!, 5140!.

28. *LITSEA PATELLARIS*, Gamble in Kew Bull. 360 (1910). A spreading evergreen tree reaching 12—18 m. in height and 20—30 cm. in diameter of stem; branchlets stout, smooth, brown, the uppermost puberulous; leaf-buds ovoid. *Leaves* sub-coriaceous, alternate; oblong or obovate, abruptly acuminate at apex, cuneate at base; upper surface smooth, shining, glabrous, lower bluish-green when fresh, grey-glaucous when dry, minutely puberulous when young afterwards glabrous; margins recurved; 20—40 cm. long, 7—14 cm. broad; midrib stout, plane above, much raised beneath; main nerves 8—10 pairs, slightly impressed above, prominent beneath, starting at about 50° with the midrib and passing obliquely with only a slight curve upwards to and along the margin where they end in small diminishing loops; transverse nervules many, arched, sometimes branching, enclosing the minutely netted reticulation; petiole stout, 2—3 cm. long. *Flowers* not known, but racemes axillary

very short. *Fruit* globose, slightly depressed, 10—12 mm. high, 15 mm. in diam., seated on the patelliform nearly flattened rugose enlarged perianth-tube 10—12 mm. in diam., margin smooth; pedicel rough, flattened, 7—8 mm. long with the cup; pericarp bright red when ripe, glossy, yellowish and wrinkled when dry.

PERAK: in dense forest at 150—250 m. alt. near Larut, *King's Collector* 7312!

29. *LITSEA FENESTRATA*, Gamble in Kew Bull. 360 (1910). A large evergreen tree reaching to 30 m. in height and a considerable girth of stem; branchlets very stout with pale brown bark, the uppermost angular and very minutely puberulous as are the lanceolate buds. *Leaves* pergamaceous, alternate; oblong or oblong-obovate, rounded or retuse at apex, attenuate or rounded and often unequal at base; upper surface more or less shining, pale olive-green; lower sub-glaucous; both glabrous except on the nerves beneath, areolate-reticulate; margins recurved, cartilaginous; 15—35 cm. long, 8—14 cm. broad; midrib very stout, nearly flat above, much raised beneath; main nerves 10—15 pairs, distant, slightly impressed above, raised beneath, starting at about 50°—60° with the midrib and curving to and along the margin; transverse nervules very irregular, branched, enclosing the areolate reticulation; petiole very stout, 1—2.5 cm. long, rugose. *Flowers* in umbellules on short (7 mm.) stout tawny-puberulous peduncles in thick dense clusters on the branches usually of 2-years' old wood; umbellules when open about 12 mm. in diam.; involucral bracts 4—5, orbicular or obovate, concave, tawny-puberulous without, glabrous within; flowers in each umbellule 6—7 on pedicels about 4 mm. long; perianth-lobes 6, linear-oblong, obtuse, villous without, glabrous within, 4—5 mm. long, recurved in flower. *Stamens* of ♂ flowers variable in number, normally 12, those of the outer rows about 6—7 mm. long with elliptic decurrent anthers, very slender slightly villous filaments and occasional glands at the base; those of the inner rows shorter and furnished a little way above the base of the filaments with a pair of oblong bifid stipitate glands, cells all introrse; rudimentary ovary 0. *Staminodes* of ♀ flowers not known. *Fruit* globose, 22 mm. in diam., at first completely enclosed in the turbinate, woody, truncate-pear-shaped, pale brown, furfuraceous, enlarged perianth tube, later on about 20 mm. long, the orifice circular, 10—12 mm. in diam., finally the orifice opening to nearly 25 mm., the fruit  $\frac{1}{2}$ — $\frac{3}{4}$  exsert; enlarged pedicel very stout,

5 mm. long; pericarp very thick, waxy-white outside when fresh, later purple.

PERAK: in dense jungle near Larut up to 250 m. alt., *King's Collector* 5938!, 6859!.—DISTRIB. Sumatra at 450 m. alt., *Forbes* 3174!. Borneo, near Kuching, *Haviland* 3088 probably.

30. *LITSEA FOXIANA*, Gamble in Kew Bull. 361 (1910). A medium-sized tree; branchlets stout, rough, pale grey, uppermost angular, minutely rusty-pubescent as are the linear-lanceolate buds, the petioles and midribs of the leaves and the inflorescence. *Leaves* subcoriaceous, alternate; elliptic or elliptic-oblong or -obovate; long cuspidate-acuminate at apex, attenuate at base; dark brown and dull and glabrous except on the prominently impressed midrib and main nerves on the upper surface, glaucescent and minutely puberulous on the lower surface; margins recurved; 10–20 cm. long, 5–7 cm. broad; midrib stout, prominent; main nerves 12–16 pairs, parallel, prominent, the lowest pair marginal, at an angle of about 60° with the midrib and curving only near the margin, the upper 2 or 3 meeting in loops below the cusp; transverse nervules many, straight, regular, parallel but faint; reticulation obscure; petiole thick, 2–3 cm. long. *Flowers* in slenderly pedunculate (about 6 mm. long) umbellules in grey-pubescent axillary or lateral racemes up to 2 cm. long in ♂, 5 mm. in ♀, the racemes sometimes in fascicles of 2–3; raceme bracts very small, deciduous; involucre bracts 4, orbicular, concave, 4–5 mm. in diam.; open umbellules nearly 10 mm. in diam. in ♂, 8 mm. in ♀; flowers in each umbellule 5–6; pedicels short or almost 0; perianth-lobes oblong, obtuse or acute, villous, ciliate, ♂ 3 mm. ♀ 1.5–2 mm. long. *Stamens* of ♂ flowers variable in number, 8–10, normally 9, the outer rows 3–4 mm. long, with ovate anthers and slender villous filaments, those of inner rows shorter with a pair of rather small subsessile glands near the bases of the filaments; rudimentary ovary 0. *Staminodes* of ♀ flowers also very variable, but normally 9, those of outer rows clavate, 2–3 mm. long, with villous filaments, those of inner rows shorter, subulate, with a pair of rather large ovate glands a little above the base. *Ovary* globose, glabrous; style thick, curved; stigma large, lateral, long-bifid. *Fruit* not known.

PENANG: at Moniot's road, *Curtis* ♂ 2305! and ♀ without number!



31. *LITSEA MONTICOLA*, Gamble in Kew Bull. 361 (1910). A tree reaching 12—15 m. in height and 45—60 cm. in diam. of stem; branchlets stout with pale brown bark, sub-quadrangular, scurfy and nearly glabrous, the small terminal buds only minutely pubescent. *Leaves* coriaceous, alternate; elliptic or elliptic-oblong or -obovate, acute or acuminate and slightly mucronate at apex, attenuate at base; both surfaces glabrous, olive-brown when dry and somewhat reddish beneath; margins recurved; 10—20 cm. long 4—6 cm. broad; midrib prominent, impressed above; main nerves 8—12 pairs, subparallel, the lowest pair marginal, impressed above, raised beneath, at about 50° with the midrib, curving gently to the margin and a little parallel to it; transverse nervules straight, subparallel, obscure as is the areolate reticulation; petiole stout, black when dry, glabrous, channelled above, 15 mm. long. *Flowers* in umbellules on rather stout, 6—8 mm. long, glabrous peduncles, in thick angled puberulous up to 20 mm. long 8—10-flowered axillary or lateral racemes; involucre bracts 4, orbicular, glabrous except the ciliate margins of the 2 inner, 4—5 mm. in diam.; flowers in each umbellule 5, densely golden-tawny-villous; perianth-lobes 6, ovate-acute or -acuminate, densely villous without, glabrous within, gland-dotted. *Stamens* of ♂ flowers variable in number and arrangement, 8—13, but normally 9; those of outer rows 3 mm. long with oblong anthers and filaments densely villous with long hairs, those of inner rows shorter and with a pair of large ovate subsessile glands near the base of the filaments; lower anther-cells lateral; rudimentary ovary 0. *Staminodes* of ♀ flowers and *fruit* not seen.

PERAK: on the top of Gunung Ejon at 1200—1400 m. alt., and near Thaiping 1000—1200 m., *King's Collector* 7000!, 8454!

This species comes rather near to *L. Foxiana*, but the leaves are not so long acuminate nor glaucous beneath nor pubescent, the racemes are short, the umbellules are glabrous instead of grey-pubescent, the flowers inside the involucre bracts are densely tawny villous, instead of being merely sparsely so, and the main nerves are more distant.

32. *LITSEA SCORTECHINII*, Gamble in Kew Bull. 362 (1910). A tree?; branchlets chestnut-brown, ferruginous-puberulous, somewhat angled; buds lanceolate, golden-pubescent, as in the inflorescence. *Leaves* chartaceous, alternate; lanceolate or elliptic-lanceolate, long- and sharply acuminate at apex, long-attenuate at base; upper surface glabrous except on the nerves, minutely reticulate; lower

faintly ferruginous-pubescent, more strongly so on the nerves; 10—17 cm. long, 4—6 cm. broad; midrib slender but prominent, deeply impressed and puberulous above, raised beneath; main nerves 6—10 pairs, impressed above, the pairs sub-opposite, curved to and along the margin, the upper ones joining in loops; transverse nervules many but faint; joined by a minutely areolate reticulation; petiole slender, 1—2 cm. long. *Flowers* in umbellules on rather short (2—3 mm.) peduncles in very short (3—5 mm.) axillary or lateral racemes, the whole shorter than the petiole; involucre bracts 5, membranous, glabrous inside, the margins fimbriate, 4 usually orbicular and concave, lobovate; flowers in each umbellule 5; perianth-lobes oblong, densely golden-villous without. *Stamens* normally 9 with much villous hair at the base, the filaments slender, the anthers subquadrate obtuse, the 3 inner with a pair of sessile oblong glands about halfway up the filaments. *Staminodes* of ♀ flowers and fruit unknown.

PERAK: at Haram Parah, *Scortechini* 866!

33. *LITSEA OCHRACEA*, Boerl. Handl. Fl. Ned. Ind. 144 (1900). A tree with spreading branches reaching 15—20 m. in height and 60—90 cm. diam. of stem; branchlets rather stout, greyish brown, somewhat angled, uppermost darker, innovations minutely tawny-puberulous, as is the inflorescence; buds lanceolate. *Leaves* chartaceous, alternate; oblong-lanceolate or -oblanceolate, shortly acuminate at apex, long-narrowed at base; upper surface dull, olive brown when dry, glabrous, lower ashy-glaucous, sometimes slightly puberulous especially along the nerves; 12—28 cm. long, 4—8 cm. broad; midrib stout, flattened above, raised beneath; main nerves 7—10 pairs starting at about 40°—50° with the midrib and curving upwards to and along the margin; transverse nervules many, more or less prominent beneath in a network of reticulation; petiole rather slender, glabrous, 12—20 mm. long. *Flowers* in very slenderly (10—12 mm. long) peduncled umbellules, corymbosely seated about 10—12 together on 8—15 mm. long axillary or lateral racemes (♀ shorter than ♂); umbellules of ♂ about 8—10 mm. broad when open, of ♀ smaller; involucre bracts 4, orbicular-ovate, concave, puberulous without; pedicels slender, about 1—5 mm. long; flowers, in each umbellule 6; perianth-tube in ♂ 1 mm. long, lobes ovate, ciliate, 2—5 mm. long. *Stamens* of ♂ flowers normally 12, those of the outer rows 2—5 mm. long with elliptic-oblong anthers and

slightly villous filaments, those of the inner rows shorter with a pair of ovate stipitate glands about halfway up the filaments; rudimentary ovary conical, glabrous. *Staminodes* of ♀ flowers (rather imperfect) 12, clavate, nearly glabrous, the inner ones with a pair of large glands somewhat above the base. *Ovary* ovoid, glabrous; style thick; stigma peltate. *Fruit* a globose berry half-enclosed in the cup-shaped tuberculate sulcate enlarged perianth-tube, 10 mm. broad at the mouth, 5 mm. high, the margin crenately lobed; enlarged peduncle thickened, 6 mm. long. *Cylicodaphne ochracea*, Blume Mus. Bot. Lugd.-Bat. II. 13; Meissn. in DC. Prodr. XV. 1. 205. *Lepidadenia ochracea*, Miq. Fl. Ind. Bat. I. i. 938.

PERAK: at Chanderiang and Goping, from about 100—250 m. alt., *King's Collector*, 5666!, 5959!; *Scortechini*?! —DISTRIB. Sumatra (*Korthals*).

34. *LITSEA OBLANCEOLATA*, Gamble in Kew Bull. 362 (1910). A small evergreen tree reaching about 10—12 m. in height and with a diameter of stem of 45 cm.; branchlets pale brown, slender, lenticellate, with raised vertical lines below the nodes and leaves; innovations and leafy buds rusty-puberulous as is the inflorescence. *Leaves* chartaceous, alternate; oblanceolate, obtuse at apex with a short abrupt acumen, long-cuneately-narrowed at base; both surfaces glabrous, dull, upper pale brown when dry, lower sub-glaucous; 10—23 cm. long, 3—6 cm. broad; midrib rather slender, slightly raised above, more so beneath; main nerves 8—10 pairs, impressed above, starting at an angle of about 40° with the midrib and at once curving obliquely to and along the margin; transverse nervules fairly regular and straight but obscure; reticulation scarcely visible; petiole slender, twisted, 10—15 mm. long, bordered above by the decurrent margins of the blade. *Flowers* in sessile umbellules on very short (at most 7 mm. long) axillary or lateral thick racemes; raceme bracts ovate, rusty tomentose; involucre bracts 4, orbicular, concave; flowers in each umbellule 4—5, on slender pedicels 2 mm. long; perianth-lobes spreading, ovate, obtuse, glabrous within, 2 mm. long. *Stamens* of ♂ flowers 9—12, slender, glabrous, those of the outer rows exsert, those of the inner rows shorter and with a pair of sessile oblong glands a little above the base of the filaments; rudimentary ovary very small, with slender style and small bifid stigma. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK: chiefly in moist places near Larut up to 90 m. alt., *King's Collector* 1952!, 2020!

This species is distinguished from *L. ochracea* chiefly by the oblanceolate leaves, very much shorter racemes and sessile umbellules; but they are very close to each other.

35. *LITSEA KUNSTLERI*, Gamble in Kew Bull. 363 (1910). An evergreen tree reaching 18 m. in height and about 50 cm. in diam. of stem; branchlets stout, angular from raised lines decurrent from the leaves, dark grey or glaucous, glabrous; buds lanceolate. *Leaves* chartaceous, alternate; oblong or oblong-lanceolate, rounded or emarginate at apex, attenuate and somewhat rounded at base; when fresh dark green above, bluish-green beneath, when dry olive-brown above, sub-glaucous beneath, both surfaces glabrous, areolate-reticulate; 15—30 cm. long, 6—12 cm. broad; midrib rather slender, slightly channelled above, raised beneath; main nerves 12—14 pairs, slender, rather irregular, starting at from 50°—60° with the midrib and curved upwards to near the margin and along it, fading off in small loops, slightly impressed above; transverse nervules irregular, branched, enclosing the areolate reticulation; petiole stout, glabrous, channelled above, 1—2 cm. long. *Flowers* in grey-puberulous umbellules on slender 8 mm. long peduncles, fascicled in very short thick axillary or lateral racemes up to 10 mm. long and about 10 together; raceme bracts ovate, caducous; umbellules (♂) when open about 12 mm. broad; involucre bracts 4—6, usually 6, the outer orbicular, the inner obovate, glabrous within; flowers in each umbellule 7; pedicels 2 mm. long; perianth-tube funnel-shaped, lobes 6, variable, usually oblong or obovate, 3—4 mm. long, glabrous within, pubescent without, gland-dotted. *Stamens* of ♂ flowers 12, those of the outer rows eglandular, up to 4 mm. long with ovate anthers and slender slightly villous filaments, those of the inner rows shorter and with a pair of rather large reniform shortly stipitate glands near the base, lower anther-cells all lateral; rudimentary ovary very small with slender style. *Staminodes* of ♀ flowers and *fruit* not known.

PERAK: near Gunong Pondo and Gunong Bubu, up to 250 m. alt., *King's Collector* 7527!, 7670!

36. *LITSEA CLAVIFLORA*, Gamble in Kew Bull. 363 (1910). A tree, reaching 10—12 m. in height and 20—12 cm. in diam. of stem; branchlets slender, pale brown, glabrous except the uppermost shoots, innovations and inflorescence which are minutely puberulous. *Leaves* chartaceous, alternate; elliptic-lanceolate or -oblanceolate, shortly acuminate at apex, narrowed at base; upper surface olive-green

when dry, dull, lower glaucous; 10—18 cm. long, 4—8 cm. broad; midrib slender, impressed above, raised beneath; main nerves about 6 pairs, impressed above, starting at about 40° with the midrib and curved to and along the margin where they become looped; transverse nervules prominent, distant, joined again transversely in a network, prominent beneath; petiole rather slender, 8—10 mm. long. *Flowers* in rather long (1—2 cm.) -peduncled subglabrous umbellules 2—3 together in a very short raceme in the axils of the upper leaves or of fallen leaves; umbellules (♂ only) about 7 mm. broad when open; involucre bracts 4, orbicular, concave, 4 mm. broad; flowers 5 in each umbellule; perianth-tube short, villous within, lobes 6, oblong, obtuse, glabrous except at base within and outside, prominently gland-dotted, 2 mm. long. *Stamens* of ♂ flowers 12, those of the outer rows 3—4 mm. long with elliptic anthers and slender villous filaments, those of the inner rows shorter with oblong obtuse anthers and a pair of large sessile quadrate glands near the bases of the filaments; rudimentary ovary conical, glabrous. *Staminodes* of ♀ flowers and *fruit* unknown.

PERAK: near Thaiping in dense forest at 150—300 m. alt., *King's Collector* 84921.

This species somewhat resembles *L. gemelliflora*, Boerl. (*Tetranthera gemelliflora*, Miq.); but that species has much thinner leaves and almost filiform peduncles, rarely more than two together on the extremely short rachis.

37. LITSEA HELFERI, Hook. f. in Fl. Br. Ind. V. 172 (1886).—  
DISTRIB. Tenasserim (or Andaman Islands) *Helfer*, K.D. 4307.

Var. *ovata*, Gamble. A tree; branchlets rather slender, dark brown, glabrous. *Leaves* subcoriaceous; ovate or elliptic, acuminate at apex, attenuate at base, upper surface olive-brown when dry, glabrous, lower glaucescent, glabrous except along the nerves; 5—11 cm. long, 3—6 cm. broad; midrib rather stout, main nerves 4—6 pairs curved to anastomose near the margin, slightly impressed above; transverse nervules prominent, joined by a prominent reticulation; petiole stout, 5—7 mm. long. *Flowers* in subglabrous umbellules on peduncles 5 mm. long, 1—3 together on extremely short tubercles in the axils of the leaves; involucre bracts reflexed in flower; flowers 4—5 in each umbellule. *Stamens* 12, the 6 of the 3rd and 4th rows biglandular, filaments glabrous; anthers subquadrate; rudimentary ovary ovoid; with a slender style. *Staminodes* of ♀ flowers and *fruit* not known.



PERAK : at Ulu Batang Padang, Wray 1600!

This may prove to be a distinct species when more and better specimens are obtainable.

38. *LITSEA MYRISTICÆFOLIA*, Hook. f. Fl. Br. Ind. V. 172 (1886). An evergreen tree reaching 15 to 18 ft. in height and 30 to 40 cm. in diameter of stem; branchlets moderately stout, grey, the uppermost nearly black when dry; buds lanceolate, leafy; all parts quite glabrous. *Leaves* coriaceous, alternate; elliptic-oblong or lanceolate or obovate, obtuse or obtusely acute or acute at apex or sometimes retuse, cuneate or attenuate at base; upper surface bright green and glossy when fresh, olive brown and dull when dry, lower dull and subglaucous; margins recurved; 8—23 cm. long, 3—7 cm. broad; midrib deeply impressed above, raised prominently beneath; main nerves 6—12 pairs, immersed and faint, curved upwards to and along the margin, transverse nervules and reticulation not apparent; petiole stout, 1—2 cm. long, channelled above. *Flowers* glabrous, in long- (1—2 cm.) peduncled umbellules, single or in pairs or many (up to 12) together on short racemes axillary or lateral on the upper branchlets; umbellules when open up to 10 mm. broad in ♂, 7 mm. in ♀; involucre bracts 4—6, orbicular, concave, reflexed; flowers in each umbellule usually 6, shortly pedicelled; perianth-tube short, lobes 6, oblong, obtuse, obscurely toothed, 3—4 mm. long in ♂ shorter in ♀, gland-dotted. *Stamens* in ♂ flowers 9—12, those of the two outer rows about 3 mm. long with ovate anthers and slender filaments, eglandular or sometimes with 1—2 small glands; those of the two inner rows shorter with oblong anthers and a pair of large reniform stipitate glands above the bases of the filaments; rudimentary ovary in 9-stamened flowers ovoid with curved style and peltate stigma, in 12-stamened flowers 0. *Staminodes* in ♀ flowers 9 to 12, usually 12, the outer 2 rows oblong clavate 2.5 mm. long, the inner two rows similar but shorter and with a pair of large reniform glands at the base. *Ovary* ovoid; style thick, much curved; stigma large, peltate, 3-lobed. *Fruit* globose, 3 mm. in diameter, half-immersed in the cupular fleshy enlarged perianth-tube 1 cm. long, 8 mm. broad at mouth; enlarged pedicel clavate, nearly at right angles with the cupules and up to 2.5 cm. long when dry; pericarp smooth. Brandis Ind. Trees 538. *Tetranthera myristicæfolia*, Wall. Cat. 2548; Nees in Wall. Pl. As. Rar. II. 67, III. 31, and Syst. Laur. 555; Kurz For. Fl. II. 302 (excluding var. 2); Miq. Fl. Ind. Bat. I. 1. 957. *Cylicodaphne*



*myristicæfolia*, Meissn. in D.C. Prodr. XV. 1. 208. *C. oblonga*, var.  $\gamma$  *Griffithii*, Meissn. l.c. 205. *Lepidadenia Griffithii*, Wight Ic. t. 1846. *Diospyros* ? *acuminata*, Wall. Cat. 4129.

PENANG: *Wallich* 2548!; *Porter* (*Wallich* 4129); at Waterfall, etc., *Curtis* 769!, 1079!; on Penang Hill, *Ridley* 7071!; at 250—350 m. alt., *King's Collector* 5204!. MALACCA: *Griffith* K.D. 4282!; *Cumming* 2321!; *Maingay* K.D. 1254!, 1267!; at Kwala Linggi, etc., *Derry* 97!, 416!, 1008!; at Sungli Hudang, *Goodenough* 1681!, *Ridley* 1603!, *Holmberg* 690!; at Alor Gajah, *Ridley* 10026!. PAHANG: at Telom ridge, *Ridley* 13725!. SINGAPORE: *Ridley* 4824!, 5973!, 6096!, 13331!.—DISTRIB. Burma.

39. *LITSEA TEYSMANNI*, Gamble in Kew Bull. 319 (1910). An evergreen tree; branchlets rather stout with pale brown lenticellate bark, uppermost blackish, glabrous or slightly puberulous; leaf-buds lanceolate, grey-puberulous. *Leaves* coriaceous, alternate, glabrous; elliptic-oblong or -obovate, obtuse or abruptly cuspidate-acuminate at apex, acute at base and often unequal; upper surface shining, olive-brown, lower paler, reddish-grey, dull; margin slightly recurved; 10—17 cm. long, 4—6 cm. broad; midrib moderately stout, raised beneath; main nerves 8—12 pairs, slender, scarcely visible above, more so beneath, at an angle of 50° with the midrib, curving upwards to and along the margin, the upper ones meeting in loops; transverse nervules irregular, branched, enclosing the rather widely netted reticulation; petiole stout, 1.5—3 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* in umbellules on slender glabrous 4—6 mm. long peduncles in slender axillary racemes 2—5 cm. long; rhachis glabrous, angular, nearly black; involucrel bracts 4, very minutely puberulous or glabrous; flowers in each umbellule ( $\varnothing$  only) 5, pedicels villous, 1 mm. long; perianth-tube villous without, glabrous within except at the mouth; lobes variable, usually oblong, obtuse, slightly villous without, glabrous within, 1 mm. long. *Stamens* of  $\sigma$  flowers not seen. *Staminodes* of  $\varphi$  flowers 12, the 6 outer clavate with slightly villous filaments, the 6 inner subulate rounded or acute at apex, with a pair of large ovate glands at the base. *Ovary* ovoid; style thick, curved then straight; stigma peltate, 3-lobed. *Fruit* ovoid at first, afterwards globose, 15—18 mm. in diam., the base enclosed in the rugose sulcate enlarged perianth-tube, at first cup-shaped, afterwards flattened, 12 mm. high including the somewhat flattened peduncle 15 mm. in diameter, the margin undulate; pericarp spotted when fresh, rugose when dry.

PERAK: at Kotah and Simpang, Wray 2409!, 3019!; in dense jungle on low ground, King's Collector 6689!. MALACCA: at Merliman, Ridley 5845!.—DISTRIB. Bangka (*Teysmann*)!; Borneo at Sarawak (*Beccari* 1649!, 4061!).

The specimens King's Collector 6689 and Beccari 4061 have usually thicker and broader and more obtuse even emarginate leaves, but the fruits are identical with the rest and some of the leaves are acute, and it does not seem to me expedient to propose a variety.

40. *LITSEA MACHILIFOLIA*, Gamble in Kew Bull. 320 (1910). An evergreen tree, reaching 12 to 24 m. in height and about 40—50 cm. in diam. of stem; branchlets slender, dark grey to nearly black when dry; leaf-buds linear, minutely grey-puberulous. *Leaves* coriaceous, alternate; oblong-lanceolate, long acuminate at apex, acute or cuneate often unequally at base; upper surface shining, glabrous, lower glaucescent when young, very minutely puberulous; margins slightly recurved; 10—20 cm. long, 3—7 cm. broad; midrib slender, slightly raised above, more so beneath; main nerves obscure, 10—15 pairs, immersed, at about 60° with the midrib and curving upwards to join near the margin in faint loops; transverse nervules few, very faint and irregular, enclosing the minutely areolate reticulation; petiole slender, black when dry, 1—2 cm. long. *Flowers* in umbellules on slender peduncles 4—5 mm. long, in slender paniculate glabrous axillary or subterminal often leafy racemes, the racemes 7—9 cm. long in ♂, 3—5 cm. in ♀; rachis angular, black; raceme bracts small, ovate, caducous; umbellules when open 8 mm. broad in ♂, 6 mm. in ♀; involucre bracts 4, sometimes 5, orbicular, glabrous, the inner slightly fimbriate or lobed; flowers in each involucre 5, very small; pedicels about 1 mm. long, very slightly villous: perianth-tube in ♀ 1—1.5 mm. long, glabrous within except a few hairs at the mouth; lobes 6—8, very variable in size and shape, those of ♂ up to 2 mm. long, of ♀ to 1 mm., often lobed or ciliate, prominently gland-dotted. *Stamens* in ♂ flowers 9—13, usually 12, glabrous, those of outer rows 2—3 mm. long with ovate anthers, those of inner rows shorter with a pair of large shortly stipitate glands, a third above the base of the filaments; rudimentary ovary ovoid; style slender; stigma cleft. *Staminodes* of ♀ flowers 12—14, normally 12, those of the outer rows clavate acuminate, and 1 mm. long, those of inner rows subulate with a pair of sessile not very large glands at their middle. *Ovary* ovoid, glabrous; style thick, curved; stigma capitate. *Fruit* globose, 10 mm. in diam., half sunk in the hemispheric enlarged

perianth tube about 8 mm. high and 12 mm. in diam. at the mouth, margin smooth; enlarged pedicel clavate, flattened, 10—12 mm. long; pericarp smooth, yellowish.

PENANG: Moniot's road at 300 m. alt., *Curtis* 795!. PERAK: *Scortechini*! SINGAPORE: garden jungle, *Ridley* 4706!, 3458!.

Var. *angustifolia*, Gamble. *Branchlets* grey. *Leaves* usually smaller and narrower, 2.5—5 cm. broad; panicles much more branched. *Flowers* smaller; involucre and rhachis sometimes slightly puberulous especially in ♀; stamens usually 9; perianth-lobes with fewer and larger glandular dots. *Fruit* globose, 15—17 mm. in diam., seated on the rugose fleshy orange-coloured nearly flat enlarged perianth-tube, which is finally about 2 mm. thick and 15 mm. in diam.; enlarged pedicel much flattened and curved 14—20 mm. long; pericarp when fresh green and spotted, when dry yellowish and wrinkled.

PERAK: Gunong Batu Pateh, at 1000 to 1400 m. alt., *Wray* 416!, 985!, 1032!, 1108!; at Gunong Haram, *Scortechini* 326!, 588!; on low ground and hills up to 250 m. alt. at Larut and Goping, *King's Collector* 3561!, 6113!, 6815!. SELANGOR: at Bukit Kutu at 900 m. alt., *Ridley* 7633!. MALACCA: at Brisu, *Derry* 653!. SINGAPORE: at Bukit Mandai, *Ridley* 6739!; *King's Collector* 1236!.

The available specimens show the fruits of the *species* not quite ripe, so the cupule may possibly flatten out as it does in the *variety*. *Wray* says that the flowers have the scent of the garden "Syringa" (*Philadelphus*.) *Scortechini's* specimens 328 have the rhachis of the inflorescence rather thicker and more puberulous.

41. LITSEA PANAMONJA, Hook. f. in Fl. Br. Ind. V. 175 (1886). A large evergreen tree, reaching 12 m. in height (*Curtis*) or more; branchlets moderately stout, greyish brown, with small lenticels and channels decurrent from below the leaf-bases, uppermost minutely grey-puberulous as are the lanceolate leaf-buds and the inflorescence. *Leaves* chartaceous, alternate; elliptic-oblong or oblong-lanceolate or -oblanceolate, acute or shortly acuminate at apex, acute at base, sometimes almost rounded; upper surface glabrous, olive-brown, lower paler, minutely grey-puberulous; 10—20 cm. long, 4—5 or even to 9 cm. broad; midrib slender, immersed or slightly impressed above, raised beneath; main nerves 10—14 pairs, slender, slightly impressed above, at an angle of about 55° with the midrib, curved upwards to and along the margin; transverse nerves obscure,

irregular and branched, enclosing an irregular reticulation; petiole rather slender, 1—2 cm. long, channelled above. *Flowers* in umbellules on rather stout peduncles 5—6 mm. long in grey-puberulous elongate often leafy racemes up to 17 cm. long in ♂, axillary to the upper leaves or the scars of fallen leaves; rhachis angled; raceme bracts small, ovate, very caducous; umbellules of ♂ when open 8 mm. in diam.; involucre bracts 4—5, the fifth when present ovate the rest orbicular concave, reflexed in flower; flowers in each umbellule 6; pedicels slender, 2 mm. long; perianth-lobes thin, variable in size and shape, usually oblong, acute or obtuse, villous without, glabrous within, gland-dotted, ciliate, 2.5—4 mm. long. *Stamens* in ♂ flowers 12, exsert, those of the outer rows 4 mm. long with oblong obtuse anthers and slender slightly villous filaments, those of the inner rows rather shorter with acute anthers and a pair of reniform lobed stipitate glands at the bases of the filaments; anther cells all introrse or the lower lateral; rudimentary ovary very small with slender style and bifid stigma. *Staminodes* of ♀ flowers and fruit not known. *Tetranthera Panamonja*, Ham. in Wall. Cat. 2553 A. B.; Nees in Wall. Pl. As. Rar. II. 67 and Syst. Laur. 561, 677; Meissn. in DC. Prodr. XV. 1. 197; Kurz For. Fl. II. 302.

PERAK: Waterloo new road, at 450 m. alt., *Curtis* 2694!.  
MALACCA: at Hulu Chambong, *Derry* 1002!—DISTRIB. India, (Assam), Burma.

This seems to be var. *longiracemosa*, Meissn. l. c.

42. *LITSEA CURTISII*, Gamble in Kew Bull. 363 (1910). A large evergreen tree with spreading branches reaching 24—30 m. in height and 60—90 cm. in diam.; branchlets rather stout, stiff, sharply angled, almost winged, black when dry; buds lanceolate, grey-puberulous. *Leaves* submembranous, alternate; elliptic or elliptic-obovate, rounded and very short acuminate, sometimes emarginate at apex, shortly attenuate and subcuneate at base; both surfaces glabrous, upper olive-brown to nearly black when dry, lower subglaucous; 15—26 cm. long, 6—11 cm. broad; midrib stout, broad, immersed above, raised beneath; main nerves 13—15 pairs, plane or slightly impressed above, slightly raised beneath, subparallel, starting at about 60° with the midrib, at first straight then curving to and along the midrib and breaking up in faint loops; transverse nervules distant, straight or slightly arched, very faint, enclosing the

minute but obscure reticulation; petiole rather thick, black when dry, straight, about 2—2.5 cm. long. *Flowers* in umbellules on peduncles about 6 mm. long, rather distantly arranged along the slender angular glabrous or slightly puberulous rhachises of axillary or lateral or sometimes subterminal occasionally leafy racemes, reaching 10—25 cm. in length in ♂, barely 10 cm. in ♀; raceme-bracts minute, very caducous; umbellules ♂ when open 1 cm. broad, ♀ narrower; involucre bracts 4, glabrous or very minutely puberulous, orbicular, concave, spreading in flower; flowers in each umbellule 5—6; perianth-tube funnel-shaped, 2.5 mm. long, villous inside; lobes 6—9, unequal, membranous, nearly glabrous, usually obovate acute, 3.5 mm. long or less in ♀. *Stamens* of ♂ flowers 9 to 14 or perhaps more, normally (apparently) 9, glabrous; those of the outer rows about 4 mm. long with ovate often apiculate anthers and slender filaments, sometimes bearing glands at the base; those of the inner rows shorter with a pair of large more or less reniform lobed stipitate glands near the base; rudimentary ovary very small, ovoid, with minute style, enclosed in the perianth-tube. *Staminodes* of ♀ flowers 12—16, those of outer rows spatulate, gland-dotted, those of inner rows subulate with a pair of large sessile glands about halfway up. *Ovary* ovoid, glabrous; style very thick, curved; stigma peltate. *Fruit* not known.

PENANG: at cooly lines, Government Hill, at 360 m. alt., *Curtis* 2449!. PERAK: in dense jungle near Larut at 90—150 m. alt., *King's Collector* 6161!; *Scortechini* 162!.

48. *LITSEA NIDULARIS*, Gamble in Kew Bull. 365 (1910). A large evergreen tree reaching 25—30 m. in height and 90—120 cm. in diam. of stem; branchlets stout, pale brown, smooth, striate when dry, with prominent leaf-scars; buds ovate, acuminate, glabrous, 1 mm. long. *Leaves* coriaceous, alternate, glabrous; oblanceolate or elliptic-obovate, rounded and sometimes emarginate at apex, long cuneate, alternate or sometimes rounded at base; upper surface shining, lower bluish-green when fresh, reddish glaucescent when dry; margins much recurved; 10—25 cm. long, 4—10 cm. broad; midrib moderately stout, channelled above, much raised beneath; main nerves 10—12 pairs, impressed above, at from 50°—60° with the midrib, at once curved to and along the margin where they end in a faint series of loops; transverse nervules rather distant, straight or arched, often branched, enclosing the prominent minutely



areolate reticulation; petiole stout, 15—25 mm. long. *Flowers* in umbellules on slender glabrous peduncles up to 15 mm. long, distantly arranged in slender racemes about 10 cm. long in ♂, scarcely 4 cm. in ♀, axillary or lateral from above the scars of fallen leaves; umbellules when open 8—10 mm. indiam. in ♂, 5 mm. in ♀; involucre bracts 4, glabrous, orbicular, concave, reflexed in flower; flowers in each umbellule 4—5 on very short (2 mm.) pedicels; perianth-lobes 6—8 in ♂, 4—6 in ♀, oblong, acute or obtuse, sparsely villous, 3 mm. long. *Stamens* of ♂ flowers 12—16, normally 12, those of the outer rows 5 mm. long with subquadrate anthers and slender sparsely villous filaments; those of the inner rows shorter with obovate anthers and a pair of large lobed shortly stipitate glands near the bases of the filaments, lower anther-cells lateral; rudimentary ovary conical, glabrous, long, those of inner rows shorter thicker with a pair of large nearly orbicular stipitate glands at the base. *Ovary* ovoid; style rather thick; stigma large, peltate, lobed. *Fruit* waxy, deep yellow in colour, depressed globose, apiculate, 14 mm. in diam., 7—8 mm. high, almost included in the rather shallow nest-like cupule formed by the enlarged perianth-tube, the cupule rugose without, under 10 mm. high and 18—20 mm. in outer diameter, the margins incurved leaving an orifice 10—12 mm. in diameter; enlarged pedicel clavate, flattened, 1 cm. long; pericarp shining, smooth when dry.

PENANG: on Government Hill, 650 m., *Curtis* 3279! in herb. Penang. PERAK: in dense jungle near Larut at 250—300 m. alt., *King's Collector* 6885!; at Hulu Kenat, *Scortechini* 759!.

44. *LITSEA MEGACARPA*, Gamble in Kew Bull. 364 (1910). A large spreading evergreen tree reaching 18 to 24 m. in height and occasionally 30 or even 36 m., with a considerable diameter of stem; branchlets stout, brown, somewhat shining, with prominent leaf-scars and occasional lenticels, the uppermost angular, often nearly black when dry, glabrous as are the lanceolate buds. *Leaves* coriaceous, alternate, glabrous; elliptic-oblong, or -obovate, obtuse and apiculate rarely cuspidate at apex, attenuate at base for the lower two-thirds sometimes rounded, often unequal; upper surface dark green and glossy when fresh, shining olive-brown when dry, lower paler, cinereous when dry; margins slightly recurved; 15—45 cm. long, 7—20 cm. broad; midrib stout, immersed above, raised beneath; main nerves 10 to 15 pairs, rather distant, irregular,



slightly impressed above, starting at from  $50^{\circ}$ — $60^{\circ}$  with the midrib and curving to and along the margin; transverse nervules obscure, distant, irregular and branched, enclosing the prominent minutely areolate reticulation; petiole stout, curved, 1.5—6 cm. long, channelled above. *Flowers* in umbellules on slender puberulous peduncles 5—20 mm. long, in slender axillary or lateral racemes reaching 10—15 cm. long in ♂, and 5—10 cm. in ♀, the rhachis angular, puberulous or glabrescent; raceme bracts minute, ovate, caducous; umbellules when open 10 mm. broad in ♂, 5 mm. in ♀; involucre bracts 4, orbicular, concave, puberulous without, the inner fimbriate on the margins; pedicels slender, silky-villous, 1—5 mm. long; flowers in each umbellule 4—5; perianth-tube funnel-shaped, 1—5 mm. long, villous; lobes 6, ovate acuminate, 2 mm. long, sparsely villous without, those of ♀ scarcely 1 mm. long. *Stamens* of ♂ flowers 9—12, usually 12, glabrous except at base, those of the outer rows 4 mm. long with oblong anthers and slender filaments, those of the inner rows shorter with a pair of large variously lobed sessile or stipitate glands from just above the base of the filaments; rudimentary ovary 0 or very small, conical with capitate stigma. *Staminodes* of ♀ flowers also 12, glabrous, those of the outer rows clavate 1.5 mm. long, those of the inner rows subulate 1 mm. long or less with a pair of large lobed glands as in ♂. *Ovary* ovoid; style thick, curved; stigma peltate, 2—3-lobed. *Fruit* large, globose, slightly depressed, about 2.5—3 cm. in diam., when very young almost enclosed in the enlarged turbinate perianth-tube cupule, later on about one-third enclosed in a cup-shaped cupule, finally scarcely 5 mm. high being at the base surrounded by the margins of a saucer-shaped cupule 2.5 mm. in diam. at the mouth and 7—10 mm. high, somewhat rugose without; enlarged pedicel thick, flattened, 15 mm. long; pericarp thick, bright red when fresh and often spotted, shining and yellowish when dry.

PROVINCE WELLESLEY: at Sungie Dhanu, *Curtis* 2511!. PERAK: at Sungie Larut and Tupai, *Wray* 2337!, 2730!; *Scortechini* 265!, 270!, 589!; in various localities about Larut up to 900 m. alt., *King's Collector* 3697!, 6076!, 6124!, 6155!, 6237!, 6409!, 6567!, 6613!, 6689!, 6774!, 6866!, 2704!. SELANGOR: at Dusun Tua, *Ridley* 7621!. SINGAPORE: at Toas, *Ridley* 6455!.

45. *LITSEA SEBIFERA*, Blume Bijdr. 560 (1825). A small tree reaching a height of 20 m. and with a diameter of stem of 42 cm.; bark ashy grey; branchlets very stout, brown, with prominent leaf-scars

and elliptic lenticels, uppermost angular, minutely puberulous; innovations silvery-silky. *Leaves* coriaceous, alternate; lanceolate or ovate-oblong or oblong-lanceolate, acute or obtuse and mucronate at apex, rather abruptly cuneate, often unequally, at base; upper surface glabrous, lower paler, when young silky-tomentose and silvery; 15—50 cm. long, 5—12 cm. broad; midrib very broad (up to 4 mm.) immersed above, much raised beneath; main nerves 14—20 pairs, slender, obscure above, not prominent beneath, starting at about 60° with the midrib and curving to and along the margin; transverse nervules few, distant, very obscure as is the reticulation; petiole stout, rugose, 1—2 cm. long, channelled above. *Flowers* in tomentose umbellules in axillary or lateral tawny-pubescent racemes 3—10 cm. long, the peduncles 2—5 mm. long; raceme bracts rather large, boat-shaped, 6 mm. long, very early caducous; umbellules when expanded about 1 cm. broad; involucre bracts 4, orbicular, concave, silky-tomentose without, glabrous within; flowers in each umbellule 5—7, sessile; perianth-tube short, grey-villous within, lobes usually 6, sometimes more, ovate acuminate, ciliolate, 3 mm. long. *Stamens* of ♂ flowers 12—16, those of the outer rows 5 mm. long with subquadrate anthers and grey-villous filaments, sometimes with glands at the base, those of the inner rows much shorter and with a pair of rather large oblong obtuse subsessile glands at the base; all the anthers introrse or the lower slightly lateral; ovary ovoid, glabrous, with short style and peltate stigma, ovule apparently fertile. *Staminodes* of ♀ flowers not seen. *Fruit* depressed-globose, 2—3 cm. diam., half-immersed in the very rough leathery obconic enlarged perianth-tube, 10—15 mm. high and 25—30 mm. in diam. at the acute mouth; enlarged pedicel stout, flattened, 10—15 mm. long; pericarp smooth, fleshy within; testa membranous; cotyledons very fleshy, much depressed, hemispheric, about 1 cm. high to 2 cm. broad. Koord. & Val. Bijdr. X. 140; Greshoff Nutt. Ind. Pl. 9 t. 3. *Lepidadenia Wightiana*, Nees Syst. Laur. 583; Wight Ic. 1837; Miq. Fl. Ind. Bat. I. 1. 933; Hook. f. Fl. Br. Ind. V. 180. *Cylicodaphne sebifera*, Bl. Mus. Bot. Lugd.-Bat. I. 388; Meissn. in DC. Prodr. XV. 1. 202. *Tetranthera calophylla*, Miq. Pl. Jungh. I. 183; Zoll. Verz. 114. *T. Roxburghii*, Hassk. Pl. Jav. 213 excl. syn.

MALAY PENINSULA: *D. T. Gwynne-Vaughan*, 397! at Bukit besar, 200 feet. SINGAPORE: Balestier road, *Goodenough* in Herb. Sing., Vern. "Malah."—DISTRIB. Java (*Zollinger* 317!, *Junghuhn* 760!, 761!; *De Vriese*, *Lobb*, *Kurz*); Borneo (*Ridley* 12429!).

Ridley writes that this plant is not really wild in Singapore, but was probably introduced from Java and planted by Javanese. Even in Java it is apparently only cultivated. Blume calls it a large tree, but I prefer to follow the latest authors, Koorders and Valetton, who describe it as small. The fruit is said to give a useful wax. The locality 'Nilghiri Hills' has been omitted, for the reasons given in the Fl. Br. Ind. Koorders and Valetton call it hermaphrodite and certainly flowers of Junghuhn 760, otherwise ♂ seem to have fertile ovules. The only fruiting specimen I have seen is that of Goodenough in the Singapore Herbarium: it has not the thick cupule of Greshoff's picture which may perhaps be badly drawn. I cannot help thinking that both *L. Garciae*, Vidal Revis. Pl. Vasc. Philipp. 228 (1886), and *L. griseola*, Elmer in Leaf. Philipp. Bot. II. 378 (1908), may belong to *L. sebifera*, Bl.

46. *LITSEA MAINGAYI*, Hook. f. in Fl. Br. Ind. V. 175 (1886). A large evergreen tree reaching 24—36 m. in height and 60—90 cm. in diam. of stem; branchlets stout, glabrous, blackish when dry, uppermost angular; buds lanceolate, grey-puberulous, as in the inflorescence. *Leaves* rigidly coriaceous, alternate, oblong or oblanceolate, obtuse acute or sometimes long acuminate at apex, attenuate and often unequal at base; both surfaces glabrous, upper shining, bullate, reddish brown when dry, lower paler; margins recurved; 16—40 cm. long, 5—13 cm. broad; midrib stout, plane above, raised beneath; main nerves 10—18 pairs, irregular, impressed above, prominently raised beneath, starting at 50°—60° with the midrib, at first straight, then curved to near the margin where they are connected in prominent loops; transverse nervules irregular, impressed above, often branched, enclosing the netted reticulation; petiole long, slender, 4—7 cm. long, black, thick at the base. *Flowers* in tomentose umbellules on peduncles 5—7 mm. long, rather distantly scattered along the rhachises of slender axillary or lateral drooping racemes up to 16 cm. long; raceme bracts boat-shaped, about 6 mm. long, very caducous, grey-puberulous; involucre bracts 4—5, coriaceous, orbicular, concave, grey-puberulous without, glabrous within; umbellules when open (♂) 10—12 cm. in diam.; flowers in each umbellule 6; perianth-tube funnel-shaped, hoary-villous on both sides, lobes 6—8 also hoary-villous without, irregular in shape, obtuse acute or acuminate, 3 mm. long. *Stamens* of ♂ flowers 12 or more, those of the outer rows 3—4 mm. long with oblong usually apiculate anthers and slender glabrous filaments, those of the inner rows much shorter, the anthers subquadrate apiculate, the filaments furnished with a pair of large usually angular glands at the base; upper anther cells introrse, lower lateral; rudimentary ovary sunk in the perianth-tube or 0. *Staminodes* of ♀ flowers and *Fruit* not known.

PERAK : in dense jungle on hills at 150—300 m. alt. near Larut, King's Collector 4737 !. MALACCA : Maingay K.D. 1264 !, 1273 !.

47. *LITSEA NORONHÆ*, Blume Bijdr. 56 (1825). A small ever-green tree reaching 12 m. in height and 20 cm. in diam. of stem, more usually a stout shrub 3—5 m. high; branchlets stout, with pale brown smooth bark, the uppermost with the lanceolate buds and innovations silky-puberulous. *Leaves* subcoriaceous, alternate; elliptic-oblong or obovate, obtuse or shortly apiculate at apex, cuneate or attenuate at base; upper surface when dry olive brown, dull, glabrous, lower grey- or reddish-glaucous, minutely puberulous or glabrous; 20—45 cm. long, 8—17 cm. broad; midrib moderately stout, slightly impressed above, much raised beneath; main nerves 10—16 pairs, impressed above raised beneath, rather irregular, starting at about 60° with the midrib, at first nearly straight, then curved to and along the margin and then joined by a series of decreasing loops; transverse nervules irregular, distant, branched, enclosing the rather largely areolate reticulation; petiole stout, curved, 1—4 cm. long, channelled above. *Flowers* in tomentose umbellules on peduncles 5—15 mm. long or longer, usually distantly arranged along slender tawny-pubescent racemes 5—20 cm. long the ♀ shorter than the ♂; racemes axillary or lateral or on older branchlets in the axils of fallen leaves; raceme bracts ovate or nearly orbicular and caducous; involucre bracts 5, orbicular, concave, 3-nerved, ciliate or the inner fimbriate, glabrous within, recurved in flower; flowers in each umbellule 5—6; pedicels 2—3 mm. long in ♂, 0 in ♀; perianth-tube 0 or very short in ♂, 2 mm. long in ♀, lobes oblong, obtuse or acute, nearly glabrous, variable in number (5—7) and shape, 3—5 mm. long in ♂, 2 mm. in ♀. *Stamens* in ♂ flowers variable in number, from 9—12, normally 9, those of the outer rows long exsert, 6 mm. long with obovate anthers and slender villous filaments sometimes glandular at base, those of the inner rows shorter, with smaller anthers and a pair of large glabrous lobed glands at the bases of the filaments; rudimentary ovary 0, or if present very small with capitate stigma. *Staminodes* of ♀ flowers also variable in number and arrangement, 9—12, normally 9, those of the outer rows slenderly clavate 1.5—2 mm. long with villous filaments, those of the inner rows short, 6 mm. long, subulate with a pair of large lobed glands as in ♂, usually flattened. *Ovary* ovoid, style much curved, thick; stigma thick, peltate, deeply lobed. *Fruit* (unripe) small, rounded, laterally compressed, broader

than long, apiculate, seated on but not immersed in the spreading enlarged oboconic or cup-shaped perianth-tube about 15—20 mm. in diam. at mouth; pedicel thickened; pericarp red when ripe. Koord. & Val. Bijdr. X. 176. *Cylicodaphne noronhiana*, Blume in Mus. Bot. Lugd.-Bat. I. 380; Meissn. in DC. Prodr. XV. 1. 202. *C. rubra*, Blume l.c.; Meissn. l. c. *Lepidadenia noronhiana*, Miq. Fl. Ind. Bat. I. 1. 934. *L. rubra*, Miq. l. c. *Tetranthera rubra*, Nees Syst. 564. *Myristica Hookeriana*, Wall. Cat. 6802?

PERAK: in Upper Perak, Ulu Tupai, etc., Wray 2688!, 3477!, 3552!, 4246!; at Goping, Chandenang, etc., up to 250 m. alt., King's Collector 1087!, 5688!, 6443!, 7495!; at L. W. Rest House, Scortechini 742!, 1901!; at Kwala Depang, Curtis 3181!, 3319!. SELANGOR: Batu caves woods, Ridley 8197!. SINGAPORE: Wallich 6802 B! ?—DISTRIB. Java, Sumatra.

Koorders and Valetton specially mention that they find only 4 involueral bracts, 5 subsessile flowers, 4 perianth-lobes and 6 stamens or staminodes. I cannot understand this as I have examined many flowers and find always the flowers of *Cylicodaphne* as I have described them. The number of stamens varies much and sometimes the perianth-lobes are partly converted into stamens, but I have rarely seen so few as 6 though this occurs sometimes as in *Curtis* 3319 and in the var. described below. I fail to see the connection with *Tetradenia* suggested by Koorders and Valetton.

*Var. hexandra*, Gamble. *Leaves* more coriaceous, very obtuse at apex, rounded at base; midrib very broad; main nerves up to 20 pairs. *Flowers* in umbellules on longer (15—20 mm.) peduncles; perianth-lobes 4, stamens usually only 6.

SELANGOR: at Ginting Biday, Ridley 7620!.

48. *LITSEA ROBUSTA*, Blume Bijdr. 560 (1825). A large spreading evergreen tree reaching 24—30 m. in height and a considerable diameter, up to 90 cm.; branchlets stout, pale brown when dry with smooth bark, the uppermost much darker, angular, minutely grey-puberulous as are the lanceolate leaf-buds; branch buds large globose with many orbicular tawny-puberulous bracts. *Leaves* submembranous, alternate; elliptic-oblong or -oblanceolate, acute or acuminate at apex, attenuate and finally often rounded at base; upper surface glossy green when fresh, olive brown when dry, glabrous, lower paler and very minutely grey-puberulous, finally glabrous; margins slightly recurved; 20—50 cm. long, 8—18 cm. broad; midrib stout, immersed above, much raised beneath;

main nerves 18—21 pairs, fairly regular and parallel, slightly impressed above, those of narrower leaves starting at  $50^{\circ}$ — $60^{\circ}$ , those of broader ones at  $60^{\circ}$  to even  $80^{\circ}$  with the midrib, only slightly curving till near the margin where they fade in small loops; secondary nerves between the main ones occasional; transverse nervules faint and usually branched, enclosing the very minute but obscure areolate reticulation; petiole stout, 3—4 cm. long, channelled above. *Flowers* in tomentose umbellules on short peduncles 5—7 mm. long in  $\sigma$ , 4—5 in  $\rho$ , in slender racemes up to 18 cm. long in  $\rho$ , 6 cm. in  $\rho$ , from the axils of fallen leaves on the previous year's wood; rhachis angular, puberulous; raceme bracts ovate, very caducous; umbellules when open 10—12 mm. broad in  $\sigma$ , slightly less in  $\rho$ ; involucre bracts 4—6, the inner small, the outer orbicular, concave, rusty-grey puberulous without, at length reflexed; flowers in each umbellule 7; pedicels thick, short or 0, perianth tube thick, villous within, lobes 6, obovate, acute or obtuse, silky-villous without, glabrous within, 4—5 mm. long in  $\sigma$ , less in  $\rho$ , lobes in  $\rho$  early deciduous. *Stamens* in  $\sigma$  flowers 12, rarely more or less, those of the outer rows 5 mm. long with oblong anthers and slender slightly villous filaments sometimes mono-glandular, those of inner rows shorter and with a pair of large flattened sessile lobed glands near the bases of the filaments; upper anther-cells introrse, lower lateral; rudimentary ovary ovoid, with short glabrous style and lateral stigma. *Staminodes* of  $\rho$  flowers usually 12, in the central flowers up to 15, those of outer rows oblong spatulate, glabrous, gland-dotted, 2.5 mm. long; those of inner rows subulate, villous behind, also 2.5 mm. long, with a pair of flattened oblong sessile glands near the base. *Ovary* ovoid, glabrous; style thick, curved; stigma capitate, reflexed, silky. *Fruit* depressed-globose, greenish-white, 15 mm. high, 25 mm. in diam., seated on the enlarged pustulate rough perianth-tube, which when quite young is nearly completely closed, when half ripe hemispheric, finally saucer-shaped and more or less spreading, 10 mm. high, 27 mm. in diam., the edges sharp; enlarged pedicel thick, flattened, curved, 20 mm. long; pericarp shining, rugose when dry. Koord. & Val. Bijdr. X. 163. *Tetranthera robusta*, Nees Syst. Laur. 564. *Lepidadenia robusta*, Miq. Fl. Ind. Bat. 1. i. 934. *Cylicodaphne robusta*, Blume Mus. Bot. Lugd.-Bat. II. 11.; Meissn. in DC. Prodr. XV. 1. 202. *Laurus grandis*, Wall. Cat. 2594 B. *Alseodaphne? costalis*, Nees in Wall. Pl. As. Rar. II. 72 and Syst. Laur. 185; Meissn. in DC. Prodr. XV. 1. 29; Hook. f. in Fl. Br. Ind. V. 146.



PERAK: in dense jungle on low hills at 90—150 m. elevation near Goping and Larut, *King's Collector* 5781!, 5878!, 6167!, 8266!. SELANGOR: at Gua Batu, *Ridley* 8529!. SINGAPORE: *Wallich* 2594b!. DISTRIB. Burma (*Griffith* 4326!).

49. *LITSEA SARAWACENSIS*, Gamble in Kew Bull. 365 (1910). A small tree (?); branchlets slender, pale brown, glabrous, uppermost and buds only minutely tawny-puberulous. *Leaves* chartaceous, opposite and subopposite; elliptic -or oblong-lanceolate, cuspidate-acuminate at apex, acute at base; upper surface reddish-brown when dry, smooth but scarcely shining, glabrous, lower paler, also glabrous; 8—14 cm. long, 2—4 cm. broad; midrib slender; main nerves 5—7 pairs, oblique, curved upwards to near the margin, and meeting in prominent arched loops, slightly impressed above; transverse nervules horizontal, irregular, obscure as is the reticulation; petiole 5—6 mm. long. *Flowers* in peduncled (2—5 mm., very slender) umbellules in short axillary or lateral racemes of about 5 and scarcely 4 mm. long; umbellules in bud 3 mm. broad, with 4 orbicular nearly glabrous concave involucre bracts about 2 mm. in diam.; flowers in each umbellule 5, sessile in bud; perianth-tube short, densely villous within, lobes 6, ovate, subacute, ciliate, 1.5 mm. long. *Stamens* of ♂ flowers (in bud only) 9, those of the 2 outer rows as long as the perianth-lobes and with slender slightly villous filaments, those of the inner row much shorter, with smaller anthers and with 2 large sessile glands near the base which is surrounded with villous hairs; rudimentary ovary very small or 0. *Staminodes* of ♀ flowers not seen. *Fruit* (immature) ovoid apiculate, seated on the obconic enlarged perianth-tube which is glabrous and smooth at the margins, the lobes deciduous; pericarp smooth, black when dry.

SINGAPORE: in reservoir woods, *Ridley* 4817!.—DISTRIB. Borneo, Sarawak, *Beccari* 905!, 1475!, 1708!, 1796!; near Kuching, *Haviland* 3077!, 3646!.

50. *LITSEA LANCIFOLIA*, Hook. f. in Fl. Br. Ind. V. 159 (1886). A bush or small tree reaching 12 m. in height and 20—30 cm. in diam. of stem; branchlets slender, pale greyish-brown, uppermost and innovations grey- or rusty-tomentose; buds lanceolate. *Leaves* membranous or chartaceous, opposite or subopposite or rarely alternate; oblong, elliptic-oblong or lanceolate, acuminate often abruptly and sometimes obtusely at apex, often mucronate, cuneate attenuate

or sometimes more or less rounded at base; upper surface dull, glabrous, lower glaucous or cinereous, rusty-tomentose when young; 7—20 cm. long, 2—6 cm. broad; midrib slender, tomentose beneath, slightly channelled above; main nerves 8 to 12 pairs, curving rather obliquely upwards to and along the margin; transverse nervules faint and irregular as is the reticulation; petiole tomentose, short, 3—7 mm. long. *Flowers* yellowish, in peduncled (up to 5 mm.) umbellules in short axillary or lateral bracteate rusty-pubescent racemes of about 5 together; umbellules about 6 mm. broad with 4 orbicular concave involucre bracts 2—3 mm. in diam., spreading in flower; flowers in each umbellule 3, very small and very shortly pedicelled; perianth-tube very short both in ♂ and ♀ and densely long-villous within at mouth, lobes 6, ovate-oblong, acute, 3 mm. long, those of ♀ smaller. *Stamens* of ♂ flowers 9, those of the outer 2 rows eglandular with small quadrate anthers and slender villous filaments 3 mm. long; those of 3 inner shorter (2 mm.) and with a pair of large rounded sessile glands at the base; rudimentary ovary ovoid with short style and 2-lobed stigma. *Staminodes* of ♀ flowers also 9, those of 2 outer rows spatulate 1 mm. long, those of the inner row short conical with 2 large rounded sessile glands and tufts of long hairs. *Ovary* ovoid, glabrous; style rather thick, bent; stigma large, peltate, lobed, all together 2—3 mm. long. *Fruit* ellipsoid, apiculate, 10 mm. long, 5 mm. in diam., seated on the slightly enlarged (4 mm. in diam., 2 mm. high) but not hardened perianth-tube which is more or less crowned with the remains of the perianth-lobes and staminodes; pericarp smooth; pedicels thickened and elongated to 3—4 mm. Prain Beng. Plants 902. *Tetranthera lancifolia*, Roxb. ex Wall. Cat. 2532; Nees in Wall. Pl. As. Rar. II. 65 and Syst. Laur. 509; Meissn. in DC. Prodr. XV. 1. 194; Miq. Fl. Ind. Bat. I. 944; Kurz For. Fl. II. 300. *T. chrysantha* and *T. pusilla*, Bl. Mus. Bot. Lugd.-Bat. I. 376. *T. attenuata*, Wall. Cat. 2534 in part.

PERAK: at Relan Tujor, Tapu and other places, Wray 996!, 1306!, 2610!, 2895!, 3438!; *King's Collector* 2963!, 3233!, 3254!, 3351!, 6609!, 10526!, 10533!. SELANGOR: at Kwala Lumpur, *Curtis* 2401!. JOHORE: at Jaffaria, *G. King*!. SINGAPORE: at Selitar, *Ridley* 6454!; at Bukit Payang, *Ridley* 12563!.—DISTRIB. India (E. Himalaya, Assam, Khasia Hills and Sylhet), Burma, Sumatra, Borneo.

Var. *rufa*, Gamble. *Leaves* smaller, narrower, more tomentose; fruit nearly globose.

PERAK: *King's Collector* 7789!, 8807!, 10113!.

In my opinion this variety hardly differs from *L. julva*, Boerl. = *Tetranthera julva*, Blume.

51. *LITSEA GRACILIPES*, Hook. f. in Fl. Br. Ind. V. 159 (1886). A small evergreen tree reaching a height of 15 to 20 m. and 40—50 cm. in diam. of stem; branchlets slender, grey, uppermost nearly black, glabrous or minutely puberulous; leaf-buds lanceolate, grey-puberulous. *Leaves* pergamaceous, opposite or subopposite; elliptic or elliptic-oblong or -oblanceolate, acute or shortly acuminate at apex, sometimes mucronate, cuneate at base or sometimes almost rounded; upper surface pale olive-brown, glabrous, lower grey, glabrous or when young slightly puberulous especially along the nerves; 10—16 cm. long, 3—6 cm. broad; midrib slender, slightly impressed above; main nerves 6—8 pairs, faint, distant, leaving the midrib at about 60° and curved to and along the margin; transverse nervules few, obscure as is the reticulation; petiole thick, 8—15 mm. long, black. *Flowers* in umbellules on slender puberulous pedicels up to 15 mm. long, in axillary or lateral very short (5 mm.) racemes of about 1—10: involueral bracts 4, orbicular, concave, rusty-puberulous without, glabrous within, the margins ciliate or the inner fimbriate, reflexed in flower; umbellules in ♂ 8 mm. in diam. in flower, in ♀ 5 mm.; flowers in each umbellule 3—4 on short pedicels; perianth-lobes 6, densely silky villous without, ovate-acute or oblong-obtuse, 2.3 mm. long in ♂, 2 mm. in ♀, gland-dotted. *Stamens* of ♂ flowers 9—12, normally 12, those of the outer rows long exsert, 5 mm. long with oblong anthers and slender slightly villous filaments, those of inner rows shorter and with a pair of reniform stipitate glands from the bases of the filaments; rudimentary ovary 0 or very small, conical, glabrous. *Staminodes* of ♀ flowers 12, those of the outer rows clavate-spathulate 1—1.5 mm. long, those of the inner rows clavate with a pair of large glands at the base. *Ovary* ovoid; style thick, curved; stigma peltate 2—3-lobed. *Fruit* cylindric-oblong, obtuse at apex, 15—17 mm. long, 6—7 mm. in diam., seated on the obconic enlarged perianth 7 mm. long with pedicel and 7 mm. in diam. at mouth; pericarp glossy green spotted with white (Kunstler), yellowish and smooth when dry; testa crustaceous; cotyledons semi-cylindric.

PERAK: at Thaipeng, *Wray* 2101!; on low ground near Larut, *King's Collector*, 5421!, 5455!. MALACCA: *Griffith* K.D. 4311!.

JOHORE: at Tanjong Kupang, *Ridley* 6457!.—DISTRIB. Borneo (*Haviland* 3327!, *Kurz*! 3329!).

52. *LITSEA UJONGENSIS*, Gamble in Kew Bull. 366 (1910). An evergreen shrub or small tree reaching 6 to 9 m. in height; branchlets rather slender, densely rusty-tomentose. *Leaves* membranous to chartaceous, opposite or subopposite; oblanceolate, rather abruptly cuspidate acuminate at apex, cuneate or attenuate at base which is slightly rounded; upper surface shining, glabrous except the tomentose midrib and nerves, lower surface rusty-tomentose on the nerves and nervules, minutely grey-pubescent between them; 12—22 cm. long, 5—7 cm. broad; midrib slightly raised above, more so beneath; main nerves 10—15 pairs, slender, curving upwards to near the margin; transverse nervules irregular, obscure, as is the reticulation; petiole rather stout, short, rusty-tomentose. 5—8 mm. long. *Flowers* in nearly sessile umbellules in very short 2—3-flowered axillary fascicles; perianth-lobes in ♀ about 1 mm. long villous outside prominently gland-dotted, more or less persistent in fruit as are the linear glabrous staminodes, the outer ones 1.5 mm. long, the inner three 1 mm. long with a pair of large glands at their base; ♂ flowers unknown. *Fruit* ellipsoid, 10 mm. long 8 mm. in diameter, seated on the disciform enlarged perianth-tube 4—5 mm. in diam. and 3—4 mm. high including the enlarged villous pedicel; style and stigma more or less persistent; pericarp crustaceous, black when dry.

NEGRI SEMBILAN: Sungei Ujong, *Ridley's Collectors* 1904!, 1942!, 2305!, 2316!, 5846!. MALACCA: at Gunong Sedang, etc., *Ridley*, 3172!, 5848!; all in Herb. Singap.

Var. *nervosa*, Gamble. *Leaves* subsessile, thickly pubescent, especially on the nerves, rounded at base; the nerves, transverse nervules and reticulation prominent. *Ovary* ovoid with long style and peltate 2-lobed stigma.

PEAK: at Gunong Batu Patch, lower camp, *Wray* 1129!; *Scortechini* 2097!

53. *LITSEA SESSILIFLORA*, Hook. f. in Fl. Br. Ind. V. 160 (1886). A small tree; branchlets as thick as a goose-quill, the uppermost subquadrangular densely rusty-tomentose; buds ovoid, short. *Leaves* chartaceous, opposite, more or less bifarious; oblong-oblanceolate, obtuse at apex with a short acuminate point, cuneate or attenuate

at base; glabrous above, except the midrib which is slightly raised and tomentose, other nerves being deeply sunk, rusty-pubescent beneath; 15–30 cm. long, 4–10 cm. broad; midrib slender on upper, stout on lower, surface where very prominent; main nerves 16–20 pairs, impressed above, very prominently raised beneath, straight or not at first then curved to meet (all but the lowest) in prominent marginal loops; secondary nerves few, transverse nervules distant but prominent, as is also the reticulation; petiole very stout, tomentose, 5–15 mm. long. *Flowers* in densely tawny-pubescent umbellules sessile in the axils of the leaves or of fallen leaves, solitary or crowded, 6 mm. in diam. in ♂, ♀ smaller; involucre bracts 4, orbicular, concave, 4 mm. in diam. (♂), smaller in ♀; perianth-tube funnel-shaped, 2–3 mm. long; perianth-lobes 6, ovate, obtuse, broader in the ♂ than in the ♀. *Stamens* of ♂ flowers 9; those of the outer 2 rows eglandular, 2.5 mm. long, with elliptic obtuse anthers and slender villous filaments; those of the inner row shorter, 1.5 mm., with a pair of large nearly or quite sessile glands at the bases of the filaments; rudimentary ovary ovoid with thick style and small bifid stigma. *Staminodes* of ♀ flowers also 9; those of the 2 outer rows clavate villous 1.25 mm. long; those of the inner row spatulate, 1 mm. long, with a pair of large glabrous subsessile glands at the base. *Ovary* ovoid, glabrous; style thick, curved at top; stigma peltate, bifid. *Fruit* (young only) ovoid, at least 7 mm. long, apiculate, seated on the funnel-shaped enlarged perianth-tube which is 5 mm. broad at the mouth and carries the remains of the perianth-lobes and staminodes; pericarp thin, smooth.

PENANG: on Government Hill, *Maingay* K.D. 1511! and *Ridley* 7917!; in Moniot's road, *Curtis* 649!. JOHORE: at Gunong Taning, *Lake* and *Kelsall* 4085!.—DISTRIB. Sumatra; Borneo (*Beccari* 1545).

*Beccari's* specimens from Borneo have the leaves smaller and not so prominently marked by sunk nerves as the others, and they are more pubescent beneath, but the flowers (♀) agree. In *Maingay's* specimens the sunk nerves and nervules make a close imitation of the well-known 'crocodile skin' pattern.

54. *LITSEA FERRUGINEA*, Blume Bijdr. 561 (1825). A large tree reaching more than 30 m. in height and a considerable girth (9 m. diam.—*King's Collector*); upper branchlets thick, striate, angular, densely dark ferruginous-tomentose; buds ovoid with densely tomentose scales. *Leaves* coriaceous, alternate or sometimes subopposite, obovate or obovate-oblong, acute and mucronate at apex, cuneately

attenuate at base; upper surface shining, glabrous except the midrib, lower minutely dark ferruginous-tomentose, more so on the nerves; margins recurved; 10—18 cm. long, 4—7 cm. broad; midrib stout, impressed above, prominently raised beneath; main nerves 10—13 pairs, parallel, at about 40° with the midrib, curved in the upper part to and along the margin, impressed above, prominently raised beneath; transverse nervules sub-horizontal, obscure as is the reticulation; petiole stout, 10—15 mm. long. *Flowers* yellowish, without densely dark-tawny-tomentose, in peduncled (5—10 mm.) umbellules in short lateral racemes of about 5 and up to 5 mm. long; umbellules 7 mm. in diam., (♂) with 4 orbicular concave involucre bracts glabrous within; flowers in each umbellule about 7 very shortly pedicelled; perianth-tube short, lobes ovate-oblong, ciliate, 3-nerved, glandular, 3 mm. long. *Stamens* in ♂ flowers 12 in 4 rows, nearly or quite glabrous; those of the 2 outer rows with subquadrate anthers and slender filaments, 1.5 mm. long, eglandular; those of 2 inner rows similar but smaller and only 1 mm. long with a pair of oblong sessile glands near the tops of the very short filaments; rudimentary ovary ovoid with thick style and short stigma. *Staminodes* in ♀ flowers also 12, glabrous, those of the outer rows spatulate, 1.25 mm. long; those of the inner rows 1 mm. long, subulate, with a pair of glands near the tops of the filaments. *Ovary* not seen. *Fruit* depressed-globose, 16 mm. in diam., 12 mm. long, when young nearly quite surrounded by the rugose cupule formed by the enlarged perianth-tube which opens out gradually and at length becomes a shallow rather thin patelliform cup under 5 mm. high and 1—2 cm. broad at mouth; pedicel obconic, rough, 5 mm. long; pericarp smooth, yellowish when dry. Koord. & Val. Bijdr. X. 179. *Cryptocarya ferruginea*, Bl. Cat. Hort. Bog. 65. *Tetranthera Blumei*, Nees in Wall. Pl. As. Rar. II. 65. *Actinodaphne Blumei*, Nees Syst. Laur. 598. *Lepidadenia ferruginea*, Miq. Fl. Ind. Bat. I. 1. 935. *Cylindrodaphne ferruginea*, Meissn. in DC. Prodr. XV. I. 207.

PERAK: Hills near Larut at 150—250 m. alt., etc., *King's Collector* 6039!, 6826!, 7546!, 8437!. SINGAPORE: at Selitar, *Ridley* 6151!.—DISTRIB. Java.

55. *LITSEA GRIFFITHII*, Gamble. An evergreen tree reaching 20 m. in height and 30—45 cm. in diam. of stem; branchlets stout, greyish-brown, somewhat angular, uppermost and innovations densely dark rusty-tomentose; buds leafy, with few deciduous scales. *Leaves* coriaceous, opposite or subopposite or rarely alternate; oblong



or elliptic-oblong, obtuse or obtusely acute at apex, cuneate or attenuate to almost rounded at base; upper surface shining, yellowish green, glabrous except on the midrib, minutely reticulate, lower surface densely light rusty-tomentose; margins recurved; 10—30 cm. long, 3—9 cm. broad; midrib flat or slightly impressed above, prominent beneath; main nerves 8—15 pairs, regular and regularly curved upwards to and along the margin, the uppermost joining in loops, faint and slightly impressed on the upper surface, densely tomentose and very prominent on the lower; transverse nervules arched; reticulation minutely areolate; petiole stout, 1—2.5 cm. long. *Flowers* yellowish or white, densely dark-tawny tomentose without, in peduncled (1—2 cm.) umbellules in short stout axillary or lateral racemes of about 5 and about 1 cm. long; umbellules 8—10 mm. in diam. (♂), 7 mm. broad (♀), with 4 orbicular or ovate concave involucre bracts, 5 mm. in diam. glabrous within; flowers in each umbellule 6—8, usually 7, very shortly pedicelled; perianth-tube funnel-shaped, 1.5 to 2 mm. long, lobes oblong ciliate, nearly glabrous within, 1—3-nerved, 4 mm. long in ♂, 2 mm. in ♀, 1.5 mm. or .5 mm. broad. *Stamens* in ♂ flowers 12, in 4 rows; those of the outer two rows with short quadrate anthers 1.5 mm. long, the filaments 4—5 mm. long, villous; those of the inner rows shorter, the anthers 1 mm. long, the filaments 2 mm. long, furnished above the base with a pair of large oblong truncate sessile glands; upper anther cells all introrse, lower all lateral; rudimentary ovary ovoid with thick straight style 2 mm. long and a bilobed papillose stigma. *Staminodes* of ♀ flowers 12, in 4 rows; those of the outer 2 rows spatulate, 1.5 mm. long; those of the inner two rows club-shaped, 1 mm. long, with a pair of large sessile glands attached above the base. *Ovary* ovoid; style very thick and fleshy, 3 mm. long; stigma peltate, 3—4-lobed and crenulate, the margins reflexed. *Fruit* ovoid, 2—2.5 cm. long and 13 mm. in diam., apiculate, half immersed in the hemispheric cup-shaped enlarged perianth-tube which is about 17 mm. high and as much in the diam. of the truncate sharply-edged mouth, prominently warted and very shortly pedicelled; pericarp smooth, wrinkled when dry. *L. Blumii*, Hook. f. in Fl. Br. Ind. V. 160, *non* Nees.

PERAK: at Changkat Jerin, Wray 2757!; at Ulu Bubong and near Larut at 90—180 m. alt., King's Collector 5865!, 8573!, 10167!. SELANGOR: in Weld's Hill Reserve, A. Burn-Murdoch 282 (Ridley 14284)!. MALACCA: Griffith K.D. 4285!; Maingay K.D. 1252!.

JOHORE: at Jaffaria, *G. King!*, *Hullett!*. SINGAPORE: Reservoir woods and garden jungle, *Ridley* 5823!, 5569!.—DISTRIB. Sumatra, in Lampongs, *H.O. Forbes* 1762!.

This is the plant described in Fl. Br. Ind. as *Litsea Blumii*, Nees, and identified from the Java specimens in Herb. Kew. Koorders and Valeton have, however, pointed out that *L. Blumii*, Nees = *L. ferruginea*, Blume, is a different plant and after examining many specimens I fully agree in their opinion, so that a new name has to be found for this species.

#### 14. NEOLITSEA, Merr.

Evergreen trees. *Leaves* alternate, opposite, subopposite or verticillate, triple-nerved, usually areolate-reticulate, more or less lanceolate; buds perulate. *Flowers* dioecious, in sessile umbellules, in clusters or short racemes in the axils of upper leaves, or on the branchlets between the nodes, the clusters with small bracts at their bases; involucre bracts 4, deciduous; flowers in each umbellule 3—7, pedicels elongating; perianth-lobes 4. *Stamens* in ♂ flowers 6; those of the two outer rows eglandular, the 2 inner biglandular, anther-cells all introrse or the lower lateral. *Staminodes* of ♀ flowers 6, arranged as the stamens, usually linear or linear-clavate. *Ovary* ovoid, style thick; stigma usually peltate, in ♂ flowers 0 or rudimentary. *Fruit* a globose berry seated on the slightly enlarged disciform perianth-tube and somewhat elongate pedicel; pericarp smooth; cotyledons hemispheric.—DISTRIB. India and Malaya, one species or more extending to the Philippines and Australia: species about 30.

- |  |                           |
|--|---------------------------|
| Leaves alternate .. .. .   | 1. <i>N. zeylanica</i> .  |
| Leaves opposite subopposite or verticillate  |                           |
| Leaves glaucous beneath, softly villous on the nerves and petioles and also on the upper branchlets and inflorescence .. ..              | 2. <i>N. villosa</i> .    |
| Leaves densely and softly rusty-villous on the under surface, on the nerves of the upper surface, on the branchlets and inflorescence .. | 3. <i>N. mollissima</i> . |
| Leaves glabrous except when young, very prominently areolate-reticulate .. ..  | 4. <i>N. Kedahensis</i> . |

1. NEOLITSEA ZEYLANICA, Merrill in Philipp. Journ. Sc. I. Suppl. 57 (1906). An evergreen tree of variable character of foliage, flowers and fruit; branchlets slender, glabrous, greyish-brown, the uppermost sometimes minutely pubescent; innovations

golden-tawny-pubescent. *Leaves* coriaceous or subcoriaceous, alternate; elliptic or elliptic-ovate or -lanceolate, acuminate often abruptly at apex with obtuse points, acute or rounded at base; glabrous on both surfaces except sometimes when very young, the lower surface glaucous or not; margin usually recurved; 6—14 cm. long, 3—6 cm. broad; midrib slender, raised on both surfaces, side ribs from about 5—8 mm. above the base, curving upwards to disappear halfway up or a little higher; main nerves irregular, 2—5 pairs, obscure as are the arched transverse nervules; reticulation areolate, sometimes prominently, more usually only under the lens; petiole slender, 1—2 cm. long, curved. *Flowers* in sessile umbellules, in short axillary or lateral (on internodes of upper branchlets) fascicles or racemes up to 10 mm. in length, the raceme bracts orbicular, ciliate; umbellule buds globose, minutely tawny-puberulous or glabrescent, 3—5 mm. in diam.; involucre bracts 4, the 2 outer orbicular, concave, the 2 inner more or less obovate; flowers in each umbellule 3 to 5 or even to 7, on silky-villous pedicels finally reaching 5 mm. long in ♂, or 1.5 mm. in ♀; perianth lobes oblong, obtuse or acute, gland-dotted, sparsely villous outside, about 3 mm. long. *Stamens* in ♂ flowers 6, exsert; those of the outer rows with small subquadrate anthers and slender filaments which are glabrous or slightly villous, 4—5 mm. long; those of the inner row similar but shorter, and with a pair of large reniform emarginate stipitate glands about half-way up the filaments (at base in bud!); rudimentary ovary 0 or very small with slender style. *Staminodes* of ♀ flowers also 6; those of the outer rows linear villous, 2 mm. long; those of the inner row linear-clavate, 1.5 mm. long, with a pair of large reniform or cordate glands at their bases. *Ovary* ovoid, glabrous; style stout, twisted; stigma large, lateral. *Fruit* globose, 8 to 15 mm. in diam., seated on the disciform enlarged perianth tube, the disk 4 mm. in diam., crenate on the margins, the lobes quite deciduous; enlarged pedicel clavate, 5—7 mm. long; pericarp smooth, shining; cotyledons hemispheric. *Tetradenia zeylanica*, Nees in Wall. Pl. As. Rar. II. 64 and III. 30. *T. foliosa*, Nees and *T. furfuracea*, Nees l.c. *Tetranthera foliosa*, *pulcherrima* (in part) and *furfuracea*, Wall. Cat. 2563, 2567, 2568. *Litsea zeylanica*, C. and Fr. Nees in Amæn. Bot. Bonn. Fasc. I. 58 (1823) t. 5; Nees Syst. Laur. 626; Meissn. in DC. Prodr. XV. 1. 226; Blume Mus. Bot. Lugd.-Bat. I. 346, Wight Ic. tt. 132, 1844; Bedd. Fl. Sylv. t. 294; Dalz. and Gibs. Bomb. Fl. 223; Brandis For. Fl. 382 and Ind. Trees 540; Hook. f. Fl. Br. Ind. V. 178; Trimen Fl. Ceyl. III. 454; Benth. & von Muell. Fl. Austral.

V. 307; Cooke Bomb. Fl. II. 540; Prain Beng. Plants 902. *L. oblonga*, Nees Syst. Laur. 678; Wight Ic. t. 1845. *L. striolata*, Blume l.c. 347; Meissn. l.c. 223. *L. foliosa*, Nees l.c. 622; Blume l.c. 346; Meissn. l.c. 222 (excl. var.  $\beta$ .); Kurz For. Fl. II. 306. *L. furfuracea*, Nees l.c. 625; Blume l.c. 347; Miq. Fl. Ind. Bat. I. 975. *L. scrobiculata*, Meissn. l.c. 223. *L. trinervia*, Juss. in Dict. Sc. Nat. XXVII. 79. *Laurus Cassia*, Linn. ex Wight in Hook. Journ. Bot. II. (1840) 336. *L. involucrata*, Vahl in Herb. Juss. ex Lamk. Dict. III. 445; Roxb. Cor. Pl. II. 46, t. 187.

PENANG: *Wallich* 2568 b!; *Curtis* 443!, 468!; at Batu Feringgi, *Ridley*!. PROVINCE WELLESLEY: at Bukit Turu, *Ridley* 6956!. PERAK: *Scortechini* 1085!. MALACCA: on Mount Ophir, etc., *Griffith* 4331!; *Maingay* K.D., 1255!; at Brisu, *Holmberg* 759!. PAHANG: at Praman and Kwala Pahang, *Ridley*! (c.f. also *Ridley* in Trans. Linn. Soc. 2nd Ser. III. 341). SINGAPORE: *Wallich* 2568a!; at Changi, Pulau Ilbin and Bedoh, *Ridley* 3604a!, 4811!, 4819!, 8406!.—DISTRIB. India (in most hilly regions), Burma (Martaban Hills), Ceylon, Borneo (Mount Kinabalu at 2500 m., *Haviland* 1128! c.f. Stapf in Trans. Linn. Soc. 2nd Ser. IV. 220), Philippines Queensland.

2. *NEOLITSEA VILLOSA*, Gamble. An evergreen tree reaching 12—18 m. in height and 35—50 cm. in diam. of stem; branchlets moderately stout, grey, the uppermost densely grey-tawny puberulous; branch buds ovate, perulate, rusty puberulous, the scales obtuse; leaf-buds in ♀ trees smaller. *Leaves* coriaceous, opposite subopposite or subverticillate, the verticils usually of 5; lanceolate or oblong-lanceolate, long and sharply acuminate at apex, acuminate at base; upper surface glabrous, shining, olive-brown when dry, minutely areolate-reticulate, lower bluish-green when fresh, glaucous when dry, glabrous except the ribs and nerves which are softly rusty-villous; margins slightly undulate, recurved; 10—15 cm. long, 3—5 cm. broad; midrib rather slender, impressed above and keeled, raised beneath; side ribs from about 7 mm. above the base, oblique, impressed above, reaching to about half-way up and then ending in diminishing small loops which connect them with the lowest pair of nerves; nervules outside them 10 or more, looped; main nerves 3—5 pairs, prominent, sometimes branched, impressed above, oblique, joined by loops near the margin; transverse nervules many, arched, fairly prominent enclosing the areolate reticulation; petiole rather slender, twisted, pubescent, 10—12 mm. long, the upper part bordered by the decurrent margins of the blade. *Flowers*

in sessile umbellules in clusters of usually 4 to 6 on the upper branchlets between the nodes; umbellule buds globose, 5—6 mm. in diameter, closely grey-tawny pubescent; involucre bracts 4, orbicular, concave; flowers in each umbellule 4—5 (buds of ♂ only); perianth-lobes 4, oblong, densely silky-villous without, glabrous within. *Stamens* of ♂ flowers 6, the 4 of the outer rows with oblong anthers and slender filaments villous only at the base, the 2 of the inner row similar with a pair of large orbicular stipitate glands at the base; rudimentary (?) ovary ovoid; style curved; stigma capitate. *Staminodes* of ♀ flowers linear clavate. *Fruit* globose, 10 mm. in diam., seated on the flattened subquadrangular enlarged perianth-tube, villous within, 3 mm. in diam.; enlarged pedicel stout, 4—5 mm. long; pericarp bright red, wrinkled when dry. *Litsea villosa*, Blume Mus. Bot. Lugd-Bat. i. 349; Meissn. in DC. Prodr. XV. 1. 221.

PERAK : in dense forest on tops of high mountains in Larut at 1200—1400 m. alt., *King's Collector* 6979!, 7011!.—DISTRIB. Amboina, Philippine Islands.

3. *NEOLITSEA MOLLISSIMA*, Gamble in Kew Bull. 366 (1910) and 172 (1911). A small evergreen tree; branchlets moderately stout, rounded, grey, the uppermost softly and closely rusty-villous; leaf-buds ovate, perulate, densely villous. *Leaves* coriaceous, opposite subopposite or subverticillate, the verticils usually of 3; lanceolate, long acuminate at apex, acute at base; upper surface shining, olive-brown when dry, glabrous except the rusty-villous midrib; lower surface densely and softly rusty-villous, the nerves especially, greyish between the nerves; margins slightly recurved; 9—12 cm. long, 2.5—3.5 cm. broad; midrib stout, raised on the upper surface; side pair of ribs starting from about 5 mm. above the base and ending half-way up or a little further; main nerves 3—4 pairs, the pairs subopposite, very oblique, slightly impressed above, raised beneath; transverse nervules many, arched, obscure, enclosing the regular minutely areolate reticulation visible only with the lens; petiole stout, rusty-villous, 6—8 mm. long. *Flowers* in densely rusty-villous sessile umbellules, 1—3 together, axillary or on the branchlets between the upper nodes; involucre bracts very caducous; flowers in each umbellule apparently 5 (♀ only) on very short villous pedicels; perianth-tube densely long silky-villous within as are the 4 lanceolate perianthlobes. *Staminodes* of ♀ flowers 6; those of the two outer rows linear-clavate, 1.5—2 mm. long, sparsely villous, the inner pair

similar but shorter and with a pair of rather large cordate stipitate glands at their bases. *Ovary* ovoid; style densely villous; stigma capitate. *Stamens* of ♂ flowers and *fruit* not seen.

PERAK: at lower camp Gunong Batu Pateh at 1000 m. alt., Wray 931!

4. *NEOLITSEA KEDAHENSIS*, Gamble in Kew Bull. 367 (1910) and 172 (1911). An evergreen tree; branchlets slender, terete, uppermost in verticils, densely rusty-villous as are the leaf-buds. *Leaves* coriaceous, verticillate, prominently areolately pitted; elliptic-lanceolate, cuspidate-acuminate at apex, narrowed at base; upper surface glabrous except when young and then rusty-villous on the ribs and nerves, lower surface strigosely villous when young especially on the ribs and nerves and margin, afterwards glabrous; margin cartilaginous, recurved; 6—11 cm. long, 2—3.5 cm. broad; midrib slender, raised on both surfaces; side ribs slender, raised, starting at about 6 mm. above the base, ending a little above half-way in lessening slender loops which join the lower main nerves; main nerves 3—5 pairs, slender, curving obliquely to near the margin and there joining in slender loops; transverse nervules many, obscure, arched, enclosing the deeply pitted reticulation; petiole slender, 5—6 mm. long, pubescent when young. *Flowers* in sessile umbellules in dense axillary or lateral clusters supported by short obtuse bracts; involucral bracts 4, orbicular, concave, ciliate or fimbriate on the margins, 5—7-nerved, densely rusty-tomentose without, glabrous within; flowers in each umbellule 5, on short long-villous peduncles; perianth-lobes 4 (♂ only) ovate, obtuse or acuminate, densely villous, 1.5—2 mm. long. *Stamens* in ♂ flowers 6, the 4 outer with oblong anthers and slender glabrous filaments, the 2 inner shorter and with a pair of reniform stipitate glands at the bases of the filaments; rudimentary ovary ovoid, sparsely villous; style slender; stigma capitate. *Staminodes* of ♀ flowers and *fruit* unknown.

KEDAH: on Kedah Peak at 900 m. alt., Ridley 3590!, 5940!

#### Tribe VII. LAURÆÆ.

##### 15. *LINDERA*, Thunb.

Shrubs or trees, often deciduous; *buds* naked or perulate. *Leaves* alternate or subopposite, pinnately veined or 3—5-ribbed, chartaceous or coriaceous. *Flowers* dioecious, in pedunculate or sessile umbel-



ules, axillary or lateral on the branchlets; involucre bracts 2 to 4, concave, usually hemispheric; flowers in each umbellule 1 to 6 or more; pedicels long or short; perianth-tube very short, lobes 6 or more, usually unequal. *Stamens* in ♂ flowers normally 9 or 12, in three or four rows; those of the outer rows eglandular; those of the inner rows biglandular; anthers all introrse, 2- (or rarely 4-) celled, filaments usually slender; ovary 0 or rudimentary with rudimentary style and usually peltate stigma. *Staminodes* of ♀ flowers normally 9 or 12, also in three or four rows; those of the outer rows clavate eglandular; those of the inner rows clavate or subulate biglandular. *Ovary* ovoid; style usually thick; stigma peltate. *Fruit* globose or ovoid, seated on the usually slightly enlarged perianth-tube with usually persistent lobes; pedicel often thickened; pericarp succulent. *Seed* 1; testa thin, cotyledons conform to seed, usually hemispheric. —**DISTRIB.** About 60 species in tropical and Eastern Asia to Japan and in North America.

Leaves 1-ribbed, penninerved; flowers in each umbellule more than 9.

Leaves subcoriaceous, ovate, short-acuminate, upper surface olive-green when dry .. .. 1. *L. malaccensis*.

Leaves chartaceous, obovate, long-acuminate, upper surface blackish when dry .. .. 2. *L. Wrayi*.

Leaves subcoriaceous, lanceolate, acuminate; main nerves about 12 pairs .. .. 3. *L. coryphylla*.

Leaves chartaceous, lanceolate, acuminate; main nerves 7—8 pairs .. .. 4. *L. polyantha*.

Leaves membranous, oblong-lanceolate, greyish; main nerves about 8—12 pairs .. .. 5. *L. pipericarpa*.

Leaves 3-ribbed, more or less penninerved on midrib; flowers in each umbellule 1—3.

Leaves chartaceous, over 6 cm. long.

Leaves long caudate-acuminate at apex; main nerves from midrib 1—3 pairs; flowers in each umbellule usually 1; perianth-lobes obtuse .. .. 6. *L. bibracteata*.

Leaves rarely caudate, usually acuminate at apex; main nerves from midrib 2—5 pairs; flowers in each umbellule 3; perianth-lobes acuminate .. .. 7. *L. caesia*.

Leaves coriaceous, usually under 6 cm. long; perianth-lobes obtuse .. .. 8. *L. rufo*.

1. *LINDERA MALACCENSIS*, Hook. f. in Fl. Br. Ind. V. 183 (1886). A tree reaching 15 to 25 m. in height and 40 to 60 cm. in

diam. of stem; branchlets dark brown to black, smooth, uppermost and lanceolate leaf-buds ferruginous-silky. *Leaves* subcoriaceous, alternate, glabrous or slightly puberulous, especially on the nerves, beneath; broadly ovate or elliptic-ovate, acuminate and often cuspidate at apex, rounded or sometimes acute at base; upper surface shining, olive-green when dry, lower dark reddish-brown; 7—17 cm. long, 4—9 cm. broad; midrib slender, raised on both surfaces; main nerves 5—7 pairs, slightly impressed above, the lowest 1—2 pairs from near the base, the rest more distant, all curving gradually and joining in loops a little distance from the margin; transverse nervules distant, irregular, the reticulation obscure; petiole slender, 1—2 cm. long, channelled above and near the top bordered by the decurrent margins of the blade. *Flowers* in pedunculate sparsely villous umbellules clustered in stout racemes in the axils of the leaves; racemes 1—6 mm. long; peduncles slender 8—15 mm. long, ♀ somewhat shorter than ♂; involueral bracts 4, the outer pair hemispheric, early deciduous; flowers in each umbellule 9 or more; pedicels slender, 1—3 mm. long; perianth-lobes 6, in ♂ obovate lobed, in ♀ oblong or spatulate, gland-dotted, 1—1.5 mm. long. *Stamens* of ♂ flowers 9, very small; those of 1st and 2nd rows glandular with glabrous filaments; those of 3rd row bearing a pair of rather large glands a little above the bases of the filaments; rudimentary ovary 0 or very small, conoidal. *Staminodes* of ♀ flowers also 9; those of rows I and II linear clavate; those of row III clavate with large glands as in ♂. *Ovary* ovoid, glabrous; style thick, curved; stigma peltate, lobed. *Fruit* a globose or ovoid drupe 6—20 mm. long, 6—15 mm. in diameter; pericarp smooth; fruiting pedicels thickened, 3—10 mm. long, surmounted by the scarcely enlarged perianth; fruiting peduncle also thickened, 15—20 mm. long.

PERAK: at Relan Tujur, Wray 3133!; *Scortechini*!; about Goping and Larut, *King's Collector* 873!, 963!, 2533!, 5139!, 5167!, 5578!, 5679!, 8839!. MALACCA: *Griffith* 4297!; *Maingay* K.D. 1257!, 1272!; at Sungei Udang, *Holmberg* 778!. JOHORE: at Batu Pahat, *Ridley* 11030!. SINGAPORE: at Bukit Timah, Choa Chu Kang and Turong, *Ridley* 3459!, 5998!, 10776!.

*Scortechini's* specimens, as also *Ridley* 3373! from Selitar and 4704! from Dalvey road, Singapore, have thinner less acuminate and less shining leaves, fewer flowers in the clusters and lighter coloured branchlets, but otherwise seem to belong to this species, and are scarcely worthy of being classed as a variety. *Griffith* 4297 is the ♀ plant of a stiff reddish brown form with long-

pedunculate umbellules. It may prove to be a separate species, when ♂ flowers and fruit are known.

I believe this species to be identical with *Lindera lucida*, Boerl. Handb. Fl. Ned. Ind. III. 147; Koord. & Val. Bijdr. X. 238, etc. I have spent some time over the question, which must have previously been considered by the author of the Fl. Br. Ind., and in deference to him I leave '*malaccensis*' as the specific name, though I fear that it may have to give way to '*lucida*.'

2. *LINDERA WRAYI*, Gamble in Kew Bull. 367 (1910). A small tree; branchlets moderately stout, smooth, black when dry; innovations and lanceolate leaf-buds ferruginous-puberulous. *Leaves* chartaceous or almost membranous, alternate; obovate or elliptic-obovate, or -oblanceolate, long cuspidate-acuminate at apex, occasionally rounded or even emarginate, long-cuneate-acuminate at base; both surfaces glabrous, the upper nearly black when dry, somewhat bullate, the lower reddish; 10—18 cm. long, 3—6 cm. broad; midrib slender, slightly impressed; main nerves 8—14 pairs, impressed above, curved upwards to join in loops near the margin; transverse nervules prominent beneath, regular, arched; reticulation obscure; petiole slender, 8—18 mm. long. *Flowers* in umbellules on slender glabrous peduncles 5—7 mm. long in short axillary or lateral racemes about 7 mm. long; involucral bracts 4, hemispheric, glabrous, deciduous; flowers in each umbellule (♂) about 7, (♀) about 8; pedicels very short; perianth-lobes ovate acute, often lobed, 1—2 mm. long, smaller in ♀ than in ♂, glabrous. *Stamens* in ♂ flowers 9, slender, glabrous, 2 mm. long; those of 1st and 2nd rows with slender filaments and obtuse anthers; those of 3rd row similar but less obtuse and with a pair of large angular glands a little above the bases of the filaments; rudimentary ovary small, conoidal. *Staminodes* of ♀ flowers 9, very minute; those of 1st and 2nd rows linear clavate, glabrous; those of 3rd row subulate with a pair of large angular glands about the middle of the filaments. *Ovary* ovoid; style long, thick, curved; stigma peltate, lobed. *Fruit* (immature) an ovoid drupe 7—10 mm. long on a much thickened pedicel, pericarp smooth.

PERAK: on Gunong Batu Pateh 1300 m. alt., on Gunong Brumber and Gunong Iras, 1500 m. alt., Gunong Bubu, 2000 m. alt., Wray 399!, 1564!, 3866!, 4149!; at Bujong Malacca, Ridley 9706!; *Scortechini*!.

Scortechini's specimens and Wray 399 have thinner more reddish leaves than the others, but I see no reason to separate them. Wray 1564 is a

specimen with rounded or emarginate leaves, but this is probably due to insect action or browsing when young.

3. *LINDERA OXYPHYLLA*, Hook. f. in Fl. Br. Ind. V. 183 (1886). A tree reaching 9—12 m. in height (Curtis); branchlets stout, blackish grey, the younger ones black when dry and smooth, glabrous except the innovations; leaf-buds lanceolate, ferruginous-pubescent. *Leaves* subcoriaceous, alternate; lanceolate or elliptic-lanceolate, acuminate at apex, cuneate at base; the upper surfaces nearly black when dry, glabrous, the lower subglaucous; 8—13 cm. long, 3—4 cm. broad; midrib rather slender; main nerves about 12 pairs, obscure, curving to the margin; secondary nerves few, between the main nerves; transverse nervules very few, obscure as is the reticulation; petiole black, channelled, 7—12 mm. long. *Flowers* in umbellules, on peduncles about 5 mm. long in short axillary and lateral ferruginous-pubescent racemes near the ends of the branchlets, 10—12 mm. long; involucral bracts 4, hemispheric, 4 mm. long, deciduous; flowers in each umbellule about 9—10; pedicels stout, short; perianth-lobes obovate-spathulate. *Stamens* of ♂ flowers 9; those of the 1st and 2nd rows on villous filaments 3 mm. long; those of the 3rd row with rather shorter filaments and 2 large reniform glands at their base, anthers ovoid 1 mm. long with large cells; rudimentary ovary small, conoidal. *Staminodes* of ♀ flowers and fruit not known. *Tetranthera oxyphylla*, Wall. Cat. 2547; Miq. Fl. Ind. Bat. I. 1. 957. *Daphnidium oxyphyllum*, Nees in Wall. Pl. As. Rar. II. 63 and Syst. Laur. 618. *Aperula oxyphylla*, Blume Mus. Bot. Lugd.-Bat. I. 366; Meissn. in DC. Prodr. XV. i. 240.

PENANG: Wallich 2547!; Government Hill at 750 m. alt., Curtis 1103!

4. *LINDERA POLYANTHA*, Boerl. Handl. Fl. Ned. Ind. III. 147 (1900). A moderate-sized tree; branchlets nearly black, angular, striate, the youngest ferruginous-puberulous as are the lanceolate naked leaf-buds and the inflorescence. *Leaves* chartaceous, alternate; lanceolate, acuminate at apex, acute, often unequally, at base; upper surface reddish-brown, glabrous, shining, the lower also reddish, often glaucescent; 9—11 cm. long, 3—4 cm. broad; midrib rather stout; main nerves 7—8 pairs, oblique, curved to the margin, somewhat raised on the upper surface; transverse nervules obscure as is the reticulation; petiole 10—15 mm. long, channelled, slender. *Flowers* in umbellules on peduncle 7—8 mm. long in short axillary

or lateral ferruginous-puberulous racemes 10—15 mm. long, the rhachis angular; involucrel bracts 4, hemispheric, deciduous, densely ferruginous-puberulous; flowers in each umbellule about 12; pedicels short; perianth-lobes ovate-oblong, villous within, 1.5 mm. long. *Stamens* of ♂ flowers 9; those of 1st and 2nd rows ovate, acute, on villous filaments; those of 3rd row similar and with a pair of large glands near the base; rudimentary ovary small, glabrous, conoidal, the style short and stigma small. *Staminodes* of ♀ flowers not known. *Fruit* a globose berry, 8—10 mm. in diam., minutely apiculate; pericarp thin. Koord. & Val. Bijdr. X. 236. *Aperula polyantha*, Bl. Mus. Bot. Lugd.-Bat. 366, 367; Meissn. in DC. Prodr. XV. 1. 241. *Polyadenia polyantha*, Nees Syst. Laur. 577; Miq. Fl. Ind. Bat. I. 961. *Laurus polyantha*, Bl. Bijdr. 554.

PERAK: at Bujong Malacca, *Scortechini* 148!—DISTRIB. Java.

5. *LINDERA PIPERICARPA*, Boerl. Handl. Fl. Ned. Ind. III. 147 (1900). A small tree reaching 9—12 m. in height; branchlets slender, nearly black, uppermost puberulous. *Leaves* membranous, alternate; lanceolate or oblong-lanceolate, acuminate at apex, acute or rounded at base; upper surface shining, olive-green, glabrous except on the midrib, lower glaucescent, puberulous especially on the nerves; 6—15 cm. long, 2—4 cm. broad; midrib slender, black, pubescent; main nerves 8—12 pairs, curving outwards to join in loops near the margin; transverse nervules straight, fairly prominent; reticulation obscure; petiole slender, 1—2 cm. long. *Flowers* in umbellules on slender 5—10 mm. long peduncles in clusters or short grey-puberulous racemes, scarcely 1 cm. long, from the internodes of the branchlets; bracts grey-puberulous, deciduous; involucrel bracts 4, semi-orbicular, concave, glabrous without, villous within, 2—3 mm. long, gland-dotted; flowers in each umbellule about 6; perianth-lobes ovate, obtuse, villous at the base within. *Stamens* of ♂ flowers 9 with 2-celled anthers; those of the 1st and 2nd rows 1 mm. long, with slender pubescent filaments; those of the 3rd row 1.5 mm. long, with a pair of rather large reniform glands about the middle of the filaments; rudimentary ovary small, conoidal. *Staminodes* of ♀ flowers not known. *Fruit* a globose berry, the size of a small pea (4—5 mm. in diam.) shortly beaked, black, seated on the slightly enlarged perianth-tube. *Aperula* ? *pipericarpa* Meissn. in DC. Prodr. XV. 1. 242. *Polyadenia pipericarpa*, Miq. Fl. Ind. Bat. I. 1. 962.

PERAK: *Scortechini* 290!; in rocky localities in forest at 900—1200 m. alt., *King's Collector* 6948!—DISTRIB. Sumatra.

6. *LINDERA BIBRACTEATA*, Boerl. Handl. Fl. Ned. Ind. III. 146 (1900). A slender shrub reaching 3 to 4.5 m. in height, or a small tree; branchlets very slender, terete, the uppermost and the lanceolate leaf-buds silkily tawny-villous. *Leaves* chartaceous, alternate; ovate- or elliptic-lanceolate, long and sharply caudate-acuminate at apex, acute or rounded at base; upper surface olive-brown, shining, glabrous except on the ribs; lower surface glaucescent, the ribs at the base very villous; 7—11 cm. long, 2 to 3.5 cm. broad; ribs 3, the midrib extending to the extreme tip of the acumen, the side ribs starting from about 2 mm. above the base, and extending to nearly two-thirds of the length of the leaf; main nerves 1 to 3 from the midrib above half its length, curving to the margin and joining in loops, outside the side ribs 10 or more short nerves arched near the margin; transverse nervules slender, prominent beneath, irregular, joined by a minutely areolate reticulation; petiole very slender, tawny-villous, 6—12 mm. long. *Flowers* in sessile umbellules in axillary clusters; involucre bracts 2 to 4, the outer if present often small, glabrous except the ciliate margins; flowers in each umbellule 1—3, usually 1; pedicels short, densely villous; perianth-lobes 6, oblong, obtuse, 2 mm. long, glabrous within, villous without, narrower and shorter and more acute in ♀. *Stamens* of ♂ flowers 9 or more, usually 9; those of the two outer rows with obtuse anthers and villous filaments; those of the inner rows rather longer but similar and with a pair of rather large glands a little above the bases of the filaments; rudimentary ovary ovoid with short style and peltate stigma. *Staminodes* of ♀ flowers also 9 to 12; those of the outer rows linear-clavate with villous filaments; those of the inner rows similar and with a pair of stipitate glands at the very base. *Ovary* ovoid, glabrous; style twisted; stigma capitate. *Fruit* a globose drupe up to about 1 cm. in diam.; enlarged perianth-tube scarcely any; pedicel clavate, 1 cm. long. Koord. & Val. Bijdr. X. 233. *Daphnidium bibracteatum*, Nees Syst. Laur. 615; Blume Mus Bot. Lugd.-Bat. I. 351; Meissn. in DC. Prodr. X. 1. 229. *D. acuminatum*, Blume l.c.; Meissn. l.c. *D. caesium*, Miq. Fl. Ind. Bat. I. 1. 976 in part only. *Laurus bibracteata*, Bl. Bijdr. 553. *L. acuminata*, and *L. microphylla*, Reinw.; Nees l.c. 611.

PERAK: on Maxwell's Hill, etc., up to 1200 m. alt., Wray 1193!, 2945!, 4162!; Larut at 450 to 600 m., King's Collector 2641!; *Scortechini* 640!; at Hermitage 900 m., Curtis 1332!; at Gunong Keladang, Ridley 9589!, at Taiping, Ridley 14515!.—DISTRIB. Java (Bantam, Forbes 354!)



Wray Nos. 1193, 4162 are fruiting specimens only and have rather smaller less acuminate leaves, not so glaucous beneath; so I am not quite sure of them.

7. *LINDERA CÆSIA*, Boerl. Handl. Fl. Ned. Ind. III 146 (1900). A small tree reaching 3 to 4.5 m. in height and a diameter of stem of 5 to 8 cm.; branchlets slender, dark brown, rather rough, the uppermost densely villous, the innovations silkily tawny-villous. *Leaves* chartaceous, alternate; elliptic-ovate or -lanceolate, long-acuminate at apex, rarely caudate, acute at base; upper surface smooth, glabrous except on the ribs, lower surface bluish green when fresh, glaucous when dry; 6—10 cm. long, 3—5 cm. broad; ribs 3, the midrib prominent, reaching the tip of the acumen, the side ribs starting from 4—5 mm. above the base, curving and ending in small loops about half-way up; main nerves from the midrib 2—5 pairs, prominent, joined near the margin by arching loops, nerves outside the side ribs about 6—8, short; transverse nervules irregular, branched and anastomosing; reticulation areolate: petiole 6—10 mm. long, slender, blackish-villous. *Flowers* in sessile umbellules in close axillary clusters; involucre bracts 2—3, if more than 2 the outer quite small, glabrescent without; flowers in each umbellule 3, sessile or on very short villous pedicels; perianth-lobes 6, lanceolate-acuminate, 1—2 mm. long, gland-dotted, villous without and at base within. *Stamens* of ♂ flowers 9 or 12; much longer than perianth-lobes, up to 5 mm., with oblong short anthers and slender villous filaments, those of the outer rows shorter than those of the inner, the inner with a pair of rounded rather small glands at the very bases of the filaments; rudimentary ovary ovoid with short curved style and large peltate stigma. *Staminodes* of ♀ flowers and fruit not known. *Daphnidium cæsium*, Nees in Mus. Bot. Lugd.-Bat. I. 351; Meissn. in DC. Prodr. XV. I. 229; Miq. Fl. Ind. Bat. I. 1. 976 (*in part only*).

PERAK: Maxwell's Hill, *Scortechini* 14!, 1200 m. alt., *Curtis* 2052!; dense forest near Larut at 1000—1200 m. alt., *King's Collector* 6951!. SELANGOR: at Sempang, *Ridley* 15597!.—DISTRIB. Java.

I believe and hope I am correct in the identification of this species from the Java specimens in the Calcutta Herbarium and from descriptions.

8. *LINDERA RUFA*, Gamble. A shrub reaching 2 m. in height; branchlets rather stout, rough, brown, uppermost ferruginous-villous as are the innovations; buds ovoid, perulate, the scales

obtuse. *Leaves* coriaceous, alternate; ovate or ovate-lanceolate, long acuminate at apex, acute at base; upper surface olive-brown when dry, shining or dull, glabrous except on the midrib, lower surface tawny-villous when young, glaucous when old, margins recurved; 4—7 cm. long, 2—3 cm. broad; ribs 3, midrib stout, produced to the tip of the acumen, impressed and usually villous above, side ribs from 4—5 mm. above the base, nearly straight, ending about half-way up; main nerves from the midrib 2—3 pairs, irregular, nerves outside side ribs 0 or few; transverse nervules very faint, reticulation areolate; petiole slender, tawny-villous, 10—15 mm. long. *Flowers* in umbellules, sessile or very shortly pedunculate in axillary tawny-villous clusters or racemes; involueral bracts 4, hemispherical, very much gland-dotted, glabrous within; flowers in each umbellule 1 to 3 on very short long-villous pedicels, perianth-lobes 6, unequal, ovate or ovate-oblong, 1.5—2 mm. long, gland-dotted, long-tawny-villous at base within as is the very short perianth-tube. *Stamens* of ♂ flowers usually 9, glabrous except at the base; those of the outer rows with shortly oblong anthers and slender filaments; those of the inner row similar and with a pair of large reniform stipitate glands at the base; rudimentary ovary ovoid, with short style and peltate stigma. *Staminodes* of ♀ flowers 9 to 12, clavate, those of outer rows longer than those of the inner which have glands at the base as in ♂. *Ovary* ovoid; style thick, twisted; stigma capitate, lobed. *Fruit* (immature) an ovoid drupe 6 mm. long, seated on the persistent perianth-lobes and staminodes; pedicel thickened and lengthened; pericarp shining. *Lindera cæsia*, Reinw. var. *rufa*, Stapf in Trans. Linn. Soc. 2nd Ser. IV. 220.

PERAK: Ulu Batang Padang 1500 m., Gunong Brumbu Pahang 2100 m. and Gunong Bubu 1500 m., *Wray* 1571!, 1511!, 3921!; *Scortechini*!; high rocks on Gunong Batu Pateh 900—1200 m. alt., *King's Collector* 8066!. SELANGOR: top of Ulu Semangko, *Ridley* 12060!.—DISTRIB. Borneo (Kinabalu 2500 m., *Haviland* 1106!); Sumatra (Mt. Dempo 2200 m., *Forbes* 2394!).

## Tribe VIII. CASSYTHEAE.

### 16. CASSYTHA, Linn.

Filiform twining parasites, adhering to their host by suckers. *Leaves* consisting of minute scales or none. *Flowers* small, herma-

phrodite, sometimes dimorphic, spicate, capitate or racemose; bracteoles 3. *Perianth*-tube short and globose or turbinate and as long as the lobes; segments 6, the 3 outer smaller. Perfect *stamens* 9 or 6, 2-celled; those of the 1st row opposite the outer perianth-lobes, introrse, those of the 2nd row opposite the inner perianth-lobes, introrse, sometimes reduced to staminodes; those of the 3rd row opposite those of the 1st row, extrorse, the filaments with a pair of glands at the base; within these and opposite those of the 2nd row 3 sessile or stipitate staminodes. *Ovary* globose, free in flower but included in the perianth-tube, which closely covers it in fruit; style short; stigma subsessile, small or capitate. *Fruit* a drupe enclosed in the enlarged inflated perianth-tube which is crowned by the remains of the lobes and stamens; pericarp of two layers, the outer thin and smooth, the inner thick and hard. *Seed* conform to the drupe; testa thin; cotyledons fleshy, at length confluent.—DISTRIB. Species about 15, chiefly Australian, with a few S. African, one in Borneo and one widely distributed.

CASSYTHA FILIFORMIS, Linn. Sp. Pl. (1753) 35. *Stems* very long, cord-like, much twisted together, often branched, glabrous or pubescent, dark green. *Flowers* in lax or dense lateral spikes 1.5—5 cm. long; bracteoles small, rounded, ciliate; rhachis puberulous. *Perianth*-tube turbinate, about 2 mm. long; lobes 6, the 3 outer very small, rounded, ciliate; the 3 inner oblong, concave, valvate. *Stamens* of the 1st row ovate, with broad filaments; those of the 2nd row with narrow filaments; those of the 3rd row triangular, with sessile rounded glands; staminodes of the 4th row triangular, acute, subsessile. *Fruit* a globose white drupe, 5—7 mm. in diameter with a hard pericarp enclosed in the fleshy enlarged perianth-tube which is crowned by its segments. Nees Syst. Laur. 642; Meissn. in DC. Prodr. XV. 1. 255; Wight Ic. t. 1647; Wall. Cat. 2608, 7534; Roxb. Fl. Ind. II. 314; Dalz. and Gibs. Bomb. Fl. 223; Griff. Notul. IV. 353; Hook. Fl. Exot. t. 167; Benth. Fl. Austral. V. 311; Trimen Fl. Ceyl. III. 555; Hook. fil. Fl. Br. Ind. V, 188; Prain Beng. Plants 904; Cooke Bomb. Fl. II. 541. 'Acatsjavalli' Rheede Hort. Mal. VII. t. 44.

MALAY PENINSULA: *Gwynne-Vaughan* 243!. PENANG: *Wallich*; *Curtis* 1203!. PERAK: *King's Collector* 4956!. PAHANG: at Rumpin river, *Ridley*!. MALACCA: *Griffith* 4238!; *Harvey*!; at Sungei Udang, *Goodenough* 1384!. SINGAPORE, *Ridley* 3380!.—DISTRIB. Throughout India, Ceylon, Arabia, Mascarene Islands, Malay Archipelago, Australia, Polynesia, Tropical Africa, America.

Family CIII. HERNANDIACEÆ.

Trees or climbing shrubs. *Leaves* alternate, simple or pinnate, entire, exstipulate. *Flowers* bisexual or monœcious or polygamous, regular, usually small, white or greenish. *Perianth* superior; segments free or shortly united below in two valvate 3—5-merous whorls or more rarely in one imbricate 4—8-merous whorl; stamens 3—5 in a single whorl; anthers 2-celled, dehiscing introrsely or laterally by 2 valves; staminodes more or less glandular, in 1 or 2 whorls outside the stamens or absent; those of the outer whorl in pairs at the base of the stamens, those of the inner whorl alternate with them. *Ovary* inferior, 1-celled; ovule solitary, pendulous, anatropous. *Fruit* dry, often longitudinally ribbed, sometimes with 2—4 longitudinal wings (*Illigera*) or with 2 terminal wings formed by accrescent perianth-segments (*Gyrocarpus*) or wingless and enclosed in an inflated cupule (*Hernandia*). *Seed* solitary, exalbuminous; embryo straight; cotyledons large, plano-convex, more or less lobed or flattened and spirally twisted. **DISTRIB.** About 35 species, tropical.

Leaves trifoliolate; fruit with 2—4 broad lateral wings .. 1. *Illigera*.

Leaves simple or peltate; fruit ovoid, not winged but enclosed in the inflated cupule .. .. 2. *Hernandia*.

Leaves broadly ovate, usually lobed; fruit with two long wings formed by enlarged perianth-lobes .. 3. *Gyrocarpus*.

(1) *Illigera* and (3) *Gyrocarpus* have already been described under *Combretaceæ*, Journ. As. Soc. Beng. LXVI. II (1897), pp. 342-345. The genus *Illigera* has later been revised by S. T. Dunn in Journ. Linn. Soc. Bot. XXXVIII, 290, and the following species admitted as belonging to the Malay Peninsula.

1. *I. trifoliata*, Dunn = *I. appendiculata*, Kurz For. Fl. Burma I. 469 (non Blume); King in Journ. As. Soc. Beng. LXVI. II. 343.

2. *I. pulchra*, Blume Bijdr. 1153 = *I. lucida*, Teyssm. & Binn.; King, l.c. 344.

2. *HERNANDIA*, Linn.

Evergreen trees. *Leaves* alternate, ovate or peltate, entire, 3—7-ribbed. *Flowers* monœcious, 3-nately involucrate at the ends of the branches of a lax panicle; each involucre with 3 flowers, the central one ♀ with a cupular involucre at the base of its peduncle, enclosing the ovary; the two lateral ones ♂, also shortly peduncled; bracts of the involucre 4—5, subvalvate in bud. *Perianth-lobes* subvalvate, those of the ♂ 3 to 6, those of the ♀ 4 to 8. *Stamens* as many as

and opposite to the outer perianth-lobes, the filaments with 1—2 glands or sometimes none at the base; anthers 2-celled, extrorsely or marginally dehiscent with longitudinal valves attached to the connective; staminodes in ♀ flowers usually 4. *Ovary* inferior, fleshy; style included in the tube, clavate at tip; stigma dilated, toothed or lobed. Fruit a drupe, enclosed in the enlarged inflated involucrel having a terminal circular orifice; pericarp ribbed or smooth, with a terminal umbilicus. *Seed* conform to the fruit, exalbuminous; testa thick, crustaceous, open at the apex opposite the radicle; cotyledons fleshy, hemispheric, lobed, ruminant; radicle short, superior.—**DISTRIB.** Species 8—12, in tropical regions of both worlds.

*HERNANDIA PELTATA*, Meissn. in DC. Prodr. XV. 1. 233 (1864). A tree; branchlets stout, smooth, marked with the scars of fallen leaves. *Leaves* rather coriaceous; broadly ovate, peltate, acute or obtuse at apex, rounded truncate or subcordate at base; margin entire, recurved; ribs 5—7 from the insertion of the petiole, usually 1—2 cm. above the base, all raised on the lower surface, nerves from the midrib about 5 pairs, about as many also from the innermost pair of ribs; reticulation prominent beneath; 10—20 cm. long, 7—15 cm. broad; petiole stout, terete, about 7 cm. long. *Panicles* 10—15 cm. long, corymbose, hoary-puberulous; bracts in pairs, ovate-spathulate, 3—5 mm. long; involucrel bracts 5—7 mm. long, oblong, obtuse; pedicels short; ♂ flower with 6, ♀ flower with 8 perianth-lobes about 5 mm. long; involucrel of ♀ flower cup-shaped, truncate. *Stamens* 3 each with 2 clavate glands at the bases of the filaments; staminodes of ♀ flower subglobose. *Fruit* an oblong 8—10-ribbed drupe 2 cm. long with a terminal rounded boss 5 mm. long, enclosed in the enlarged inflated lanceolate involucrel which is open at top in a circular orifice; pericarp leathery, smooth without. *Seed* globose, 1—5 cm. in diam; testa crustaceous, emarginate at apex; cotyledons fleshy, palmately lobed, ruminant. Kurz For. Fl. II, 309; Bedd. Fl. Sylv. Madr. t. 300; Benth. Fl. Austral. V. 314; Hook. f. in Fl. Br. Ind. V. 188; Trimen Fl. Ceyl. III. 456; Koord. & Val. Bijdr. VII, 108; Brandis Ind. Trees, 542. *H. sonora*, Linn. Sp. Pl. I. 981 *in part*; Bl. Bijdr. 550; Wight Ic. t. 1855; Wall. Cat. 7811; Miq. Fl. Ind. Bat. I. 1. 887.

**DINDINGS**: at Pangkore Laut at sea level, Wray 4252!; *Curtis* 3446!. **SINGAPORE**: *Wallich* 7811 D!.—**DISTRIB.** Ceylon, Andamans, Malay Archipelago, N. Australia, Pacific Islands, E. Africa, Madagascar.

*Materials for a Flora of the Malayan Peninsula*, No. 23.—By J. SYKES  
GAMBLE, C.I.E., M.A., F.R.S., *late of the Indian Forest  
Department.*

This Part, continuing the Monochlamydeæ, deals with the Families Nos. 100 Myristicaceæ, 101 Monimiaceæ, 105 Thymelæaceæ (including 105 *bis* Gonystylaceæ which should properly have come in Thalamifloræ near Tiliaceæ), 106 Elæagnaceæ and 108 Santalaceæ (including the genus *Champereia* which should properly have come in Opiliaceæ), all the work of Mr. Gamble. In the descriptions of Myristicaceæ he has closely followed the recent Monograph of the whole Family by Dr. Warburg of Berlin (*Nova Acta Acad. Leop.-Carol. Bot.* LXVIII); and in Monimiaceæ he has followed that of Miss Janet Perkins in Engler's 'Pflanzenreich' so that there are no new genera or species. In Thymelæaceæ there is one new species and in Santalaceæ there are four, making five in all. The Latin descriptions of these species have been published in the Kew Bulletin.

Altogether, in the 6 Families described there are 16 genera and 73 species of which, as above mentioned, 5 species are new.

The next part, No. 24, will contain, with other Families, the description of the Family Piperaceæ (No. 98) by Monsieur Casimir de Candolle of Geneva, who has described a large number of new species.

Family C.—MYRISTICACEÆ.

Evergreen trees, often stellately-tomentose, sometimes with branching hairs. *Leaves* alternate, entire, penni-nerved, sometimes pellucid-punctate, exstipulate. *Flowers* dioecious, small, regular, bracteate, in axillary or lateral (from scars of fallen leaves) panicles, cymes, umbels or fascicles, rarely in racemes; bracteoles persistent or caducous; perianth gamophyllous, inferior, with 3 (sometimes 2 or 4) lobes valvate in bud; androecium of 3—18 (or even —30 or more) extrorse anthers, connate in a sessile or stipitate column, head, ring or disc, sessile or sometimes with short filaments; anthers 2-celled, linear or ovate; ovary superior, free, sessile, 1-celled; stigma capitate, discoid or lobed; ovule 1 basal, erect, anatropous. *Fruit* more or less fleshy, splitting usually into 2, sometimes into 4, valves. *Seed* erect, enclosed in a thin or fleshy, entire or lacerate, usually highly coloured, often aromatic arillus; testa usually thick; albumen copious, hard,



usually ruminant; embryo very small, basal; cotyledons divaricate, flat or crumpled; radicle short, inferior.—DISTRIBUTION: Tropical regions of Asia and Australia (181), America (38), and Africa (16), 235 species (Warburg).

Anthers attached more or less by their backs to a column formed of the connate filaments.

Anther column sessile

Anthers completely attached to the column; arillus entire or nearly so .. .. 1. *HORSFIELDIA*.

Anthers attached to the column by their lower parts only, their apices free; arillus laciniate almost to the base .. .. 2. *GYMNACRANTHERA*.

Anther column stipitate, and usually produced beyond the anthers, which are completely attached to it; arillus laciniate almost to the base .. 3. *MYRISTICA*.

Anthers attached by their bases stellately to a peltate usually stipitate column formed of the connate filaments; arillus laciniate at the apex only or not at all (except *K. retusa*) .. .. 4. *KNEMA*.

#### 1. *HORSFIELDIA*, Willd.

Diocious trees with evergreen chartaceous glabrous leaves, the main nerves joining near the margin, the transverse nervules obscure. *Inflorescence* of loose (at any rate the ♂) usually compound panicles; bracts sometimes large, usually caducous; flowers small, globose or subclavate, pedicellate or rarely sessile, bracteoles 0; perianth 2—4-toothed. *Andræcium* sessile or subsessile; filaments combined in a globose or clavate column; anthers 12—30 completely attached to the column by their backs. *Stigmas* very small, sessile, connate. *Fruit* globose or ovoid-globose; pericarp leathery, rarely succulent; arillus entire or scarcely laciniate. *Seed* conform to the fruit; testa thin, woody; albumen ruminant; cotyledons connate at the base.—DISTRIB. S. Asia from India to New Guinea, species about 51.

Anthers fully touching each other.

Perianth bivalved (very rarely 3-valved) .. 1. *H. globularia*.

Perianth 3-valved for the most part at least.

Lobes of the perianth papillose within .. 2. *H. canarioides*.

Lobes of the perianth not papillose.

♂ flowers elongate or oval.

♂ flowers large, 4—5 mm. long, elongate, as long as the pedicel; leaves thickly hairy beneath .. .. 3. *H. superba*.

♂ flowers medium-sized, 2—3 mm. long, oval-globose, much shorter than the pedicel; leaves thickly hairy beneath .. 4. *H. flocculosa*.

- ♂ flowers medium-sized, 3 mm. long, elongate, longer than the pedicel; leaves glabrous beneath .. .. 5. *H. fulva*.
- ♂ flowers globose.  
Leaves hairy.  
♂ flowers somewhat longer than their pedicels; leaves usually very large, transverse nerves strongly impressed .. .. 6. *H. grandis*.  
♂ flowers as long as their pedicels; leaves rather small, transverse nerves indistinct .. 7. *H. tomentosa*.  
Leaves glabrous.  
Flowers large, 2 mm. long; inflorescence pubescent .. .. 8. *H. Wallichii*.  
Flowers smaller, 1—5 mm. long; inflorescence nearly glabrous .. .. 9. *H. amygdalina*.
- Anthers free at the margins.  
Perianth almost always 2-valved.  
♂ flowers large, 2 mm. long .. .. 10. *H. majuscula*.  
♂ flowers small, up to 1 mm. long.  
Young branches with two raised lines; leaves thin .. .. 11. *H. Irya*.  
Young branches without raised lines; leaves thick.  
Inflorescence glabrous; flowers somewhat longer than their pedicels .. .. 12. *H. sucosa*.  
Inflorescence pubescent; flowers somewhat shorter than their pedicels .. .. 13. *H. crassifolia*.
- Perianth 3-valved.  
Young branches with two raised lines .. 14. *H. brachiata*.  
Young branches without raised lines.  
♂ inflorescence pubescent; fruit ovate, under 2 cm. long .. .. 15. *H. Lemanniana*.  
♂ inflorescence weakly pubescent; fruit almost globose, over 3 cm. long .. .. 16. *H. subglobosa*.  
♂ inflorescence quite glabrous; leaves thinner and narrower .. .. 17. *H. Ridleyana*.

*Species of which the ♂ flowers are unknown.*

- Fruit ovate, 5 cm. long, 3 cm. broad; leaves 15—25 cm. long, 5—8 cm. broad with 12 main nerves .. 18. *H. racemosa*.

1. *HORSFIELDIA GLOBULARIA*, Warb. Monog. Myrist. 288, t. xxi (1897). A glabrous bushy tree reaching 9—15 m. in height; branchlets cinereous, rather rough, lenticellate, uppermost with faint pairs of lines decurrent from the leaf-axils. *Leaves* thinly coriaceous; oblong, obovate-oblong or narrowly elliptic-oblong, rather abruptly acuminate at apex, cuneate at base; upper surface dark greenish-brown

when dry, lower pale brown, both puncticulate; margins slightly revolute; 15—30 cm. long, 4—10 cm. broad; midrib rather stout, flattened above, prominent and rough beneath; main nerves 11—18 pairs, rather faint and thin, at first straight then curving to vanish or join in very faint loops near the margin; reticulation obscure; petiole 1—1.5 cm. long, rather rough. *Flowers*: ♂ in axillary spreading glabrous panicles 7—16 cm. long and 7—8 cm. broad; branches many, many-flowered; pedicels 1—3 mm. long; perianth very coriaceous, transversely 2-valved, 3 mm. long, 4 mm. broad, slightly rugose outside, the margins of the valves meeting when in bud but not overlapping; andræcium an obconic compressed sessile 2-lobed cup, bearing about 20—30 elongate linear anthers, connate from base to apex, each anther completely inflexed about the middle: ♀ in panicles much shorter than the ♂; pedicels thick; ovary glabrous, sessile, faintly bilobed. *Fruit* small, almost globose; 13 mm. long, 12 mm. broad; pericarp thick, glabrous. *Seed* 9 mm. long, 7.5 mm. broad; testa thin; arillus complete, red. *Myristica globularia*, Bl. Rumphia I. 190, t. 64, fig. 2; Miq. Fl. Ind. Bat. I. 2. 66; A. DC. Prodr. xiv. 1. 202 in part. *M. bivalvis*, Hook. f. in Fl. Br. Ind. v. 107; King Ann. Cal. III. 307, t. 139.

MALACCA: Ridley!. SINGAPORE: Garden jungle, Murton 149!; Ridley 2644!; cult. in Botanic Garden, Ridley 393!—DISTRIB. Java, Celebes, Amboina.

2. *HORSFIELDIA CANARIOIDES*, Warb. Monog. Myrist. 294, t. xxi (1897). A tree reaching 10—20 m. in height and up to 60 cm. in diameter of stem; branches spreading; branchlets cinereous, rough, slender, the youngest dark brown nearly glabrous; leaf-buds linear-lanceolate, puberulous, under 1 cm. long. *Leaves* thinly coriaceous; elliptic-oblong to elliptic, acute or shortly acuminate at apex, rounded and slightly oblique at base; both surfaces brown when dry, the lower slightly paler than the upper; margins revolute; 12—24 cm. long, 5—8 cm. broad; midrib moderately stout, slightly impressed and keeled above when dry; main nerves 12—15 pairs, faint on the upper, slightly prominent on the lower surface, sub-horizontal; reticulation very obscure; petiole 7—12 mm. long, stout. *Flowers*: ♂ in slender much-branched many-flowered spreading panicles from the axils of the leaves and of fallen leaves, 5—8 cm. long and as much broad; rhachises puberulous; cymules subumbellate; pedicels slender up to 4 mm. long, glabrous; perianth globose in bud, glabrous, teeth 3—5, cut nearly to the base, spreading, acute, papillose within; andræ-

cium subsessile, turbinate, almost annular, about 1 mm. high; anthers about 10, incurved at tip: ♀ in lax spreading slender panicles 15—23 cm. long, not otherwise known. *Fruit* oblong-ovoid, blunt at the apex, slightly narrowed at the base; 6—8 cm. long, about 3 cm. in diam., glabrous; pericarp leathery, 6 mm. thick. *Seed* 5 cm. long, cylindric-elliptic, the apex subapiculate, the base rounded; testa smooth with bold longitudinal coloured markings; arillus thin, fleshy, extending to the apex, slightly lacinate, occasionally with wide areolae at the sides. *Myristica* sp. Hook. f. in Fl. Br. Ind. V. 13 (Coll. *Maingay*). *M. canarioides*, King Ann. Calc. III. 304, t. 134.

PERAK: at Ulu Bubong and Ulu Bera at 120—240 m. alt., *King's Collector* 10064!, 10194!, 10562!, 10816!, 108451!. MALACCA: *Maingay* K.D. 1298!; at Lubok Kedondong, *Ridley* 3313!. SINGAPORE: at Sungei Turong, Bukit Mandai and Stagmount, *Ridley* 6095!, 8426!, 8906!, 11270!.

3. *HORSFIELDIA SUPERBA*, Warb. Monog. Myrist. 295 (1897). A tree reaching 12—15 m. in height and probably considerably more ('a lofty tree' *Ridley*); branches spreading; branchlets very stout, cinereous-brown, rough, prominently marked with the large scars of fallen leaves, the younger ones covered, as are the undersurfaces of the leaves and the panicles, with loose scurfy bright rufous minute stellate tomentum; buds lanceolate, 3 cm. long. *Leaves* large, coriaceous; elliptic to elliptic-lanceolate or oblanceolate, acute or shortly acuminate at apex, attenuate and slightly unequal at base; upper surface when young densely tomentose, ultimately glabrous except the midrib, somewhat shining, lower dull; margins slightly revolute when dry; 25—70 cm. long, 10—22 cm. broad; midrib very stout; main nerves 15—30 pairs, impressed on the upper, very prominent and almost winged on the lower surface when dry, spreading, straight at first, inter-arching near the margin; reticulation obscure; petiole 12—25 mm. long, very stout. *Flowers*: ♂ in robust branching panicles from the scars of fallen leaves, 10—15 cm. long; branches many, 2—5 cm. long with somewhat flattened peduncles; flower clusters subumbellate; pedicels up to 1 cm. long; perianth leathery, ellipsoid or slightly obovoid, obtuse, 6—8 mm. long, teeth 3—4, triangular; androecium shorter than the perianth, obtuse, ovoid; anthers nearly 20, quite connate: ♀ in stout woody racemes 2—5 or more cm. long, the rhachis woody, pale, rufous tomentose; perianth coriaceous, glabrous, widely tubular with 2—3 shallow acute teeth; ovary ovoid, slightly oblique, glabrous, grooved; stigma flat. *Fruit*

ovoid-globose, rough, warted, glabrescent, 6—8 cm. long and nearly 5 cm. in diam.; peduncle stout, woody, 10—12 mm. long; pericarp succulent, 12—18 mm. thick. *Myristica superba*, Hook. f. and Th. Fl. Ind. 162; A. DC. in Prodr. xiv. 1. 194; Miq. Fl. Ind. Bat. I. 2. 62; Hook. f. Fl. Br. Ind. V. 105; King Ann. Calc. III. 298 tt. 124 bis, 125 bis.

PENANG: *Phillips*!; at Waterfall, *Curtis* 2966!. PERAK: *Scortechini*!; near Gunong Batu Puteh at 450—600 m. alt., *King's Collector* 8624!. SELANGOR: at Ulu Selangor, *Goodenough* 10526!. MALACCA: *Hervey*!; at Jasin, *Holmberg* 2100!. SINGAPORE: at Sungei Benkang, *Ridley* 2161!.

4. *HORSFIELDIA FLOCCULOSA*, Warb. Monog. Myrist. 297 (1897). A handsome tree reaching 12—20 m. in height and 25—50 cm. in diam. of stem; branches spreading; branchlets stout, when young densely clothed with thick felted bright rufous tomentum, when old subglabrous, striate, rough and cinereous. *Leaves* large, coriaceous; oblong-lanceolate or oblanceolate, acute or acuminate at apex, rounded or slightly cuneate at base; upper surface hispid puberulous, the midrib and nerves flocculent-tomentose when young ultimately glabrous, lower densely covered with pale cinnamomeous stellate flocculent tomentum; margins revolute when dry; 30—45 cm. long, 10—18 cm. broad; midrib very stout; main nerves 15—20 pairs, impressed on the upper, boldly prominent on the lower surface, rather straight at first but inter-arching near the margin; transverse nervules faint, slightly impressed on the upper surface; reticulation obscure; petiole 1—2 cm. long, very stout, tomentose. *Flowers*: ♂ in robust spreading many-flowered panicles from the axils of fallen leaves, 15—20 cm. long, 8—10 cm. broad; rhachises and peduncles flocculently cinnamomeous-tomentose; cymules rather loose; pedicels slender, clavate, 3—4 mm. long; perianth obovoid, thin, glabrous, 3 mm. long, teeth 3—4, shallow, acute; andrœcium subsessile, obovoid, truncate at apex, 2 mm. high; anthers about 10, confluent and incurved at top: ♀ not known. *Fruit* unknown. *Myristica flocculosa*, King Ann. Calc. III. 302, t. 131.

PERAK: in dense forest near Ulu Kerling at 120—180 m. alt., *King's Collector* 8618!.

5. *HORSFIELDIA FULVA*, Warb. Monog. Myrist. 297 (1897). A tree, reaching 12—15 m. in height; branchlets rather stout, pale brown, slightly rough, scurfy, rufous-puberulous when young.

*Leaves* coriaceous; elliptic-oblong, often obovate, acute at apex, attenuate at base; both surfaces glabrous, dull, reddish-brown when dry, the lower the paler; margins recurved; 10—17 cm. long, 4—6 cm. broad; midrib stout, scurfy, rufous-puberulous on both surfaces; main nerves 12—14 pairs, stout, straight at first, curved near the margin; reticulation obscure; petiole 6—10 mm. long, rufous-puberulous, thick. *Flowers*: ♂ from the young branchlets below the leaves in crowded spreading many-flowered scurfy stellate-pubescent rufous panicles, 5—8 cm. long; ultimate branchlets subumbellate; pedicels slender, 2 mm. long; perianth obovoid, 4—5 mm. long, glabrous on both surfaces, divided for  $\frac{1}{3}$  or  $\frac{1}{4}$  of its length into 3 broadly triangular teeth; androecium sessile, cylindric, slightly apiculate; anthers about 10, connate from base to apex: ♀ not known. *Fruit* from the branchlets below the leaves, solitary, on woody warted often curved peduncles 12 mm. long or more, ovoid, compressed, slightly pointed, glabrous, 2.5 cm. long, 2 cm. in diam.; pericarp thick, yellowish, subsucculent, dehiscing in 2 divaricating valves. *Seed* broadly ovoid; testa thin, shining, the rugulose albumen appearing through it; arillus reddish-orange, thin, tough, entire, completely enveloping the seed. *Myristica fulva*, King Ann. Calc. III. 297, t. 124.

PERAK: at Goping, *Scortechini* 184!. MALACCA: *Maingay* K. D. 1304!.

VAR. *paludicola*, Warb. l.c. *Leaves* slightly appressed puberulous beneath; petiole 1.5—3 cm. long. *Flowers*: ♀ in lateral ferruginous-puberulous panicles 4—8 cm. long; rhachis stout, angular or flattened, as are the branches; perianth ovoid obtuse, 2-lobed, the lobes prominently persistent and recurved in fruit. *Myristica paludicola*, King Ann. Calc. III. 328, t. 169.

PERAK: in wet ground, at low elevations, *King's Collector* 4267!, 4706!, 6688!; *Wray* 3071!. SINGAPORE: at Selitar, *Ridley* 6126!

This may be merely the ♀ form of *H. fulva*.

6. *HORSFIELDIA GRANDIS*, Warb. Monog. Myrist. 301 (1897). A small tree, reaching 6—9 m. in height and 15—20 cm. in diam. of stem; branchlets stout, at first densely rufous-tomentose, afterwards striated, tomentose on the ridges and glaucous in the furrows, ultimately glabrous with rough striated reddish-brown bark. *Leaves* large, thinly coriaceous; elliptic-oblong, very shortly and suddenly acuminate or blunt at apex, rounded or slightly cune-



ate and often unequal at base; upper surface bullately reticulate, scabrid from numerous short stiff branching hairs, glabrescent when old, lower surface densely and uniformly covered with bright reddish-brown stellate tomentum; margins slightly revolute when dry; 25—40 cm. long, 10—20 cm. broad; midrib stout, rather broad and strong, densely tomentose beneath; main nerves 16—19 pairs, spreading and arching within the margin, impressed on the upper, prominent on the lower surface; transverse nervules very prominent, impressed above, raised beneath and joined by an irregular prominent reticulation; petiole 2.5—6 mm. long, stout. *Flowers*: ♂ in branching many-flowered panicles 18—25 cm. long, 6—8 cm. broad, from the axils of leaves or of fallen leaves; rhachis and branches densely pale rufous-lanate; cymules dense; pedicels very short, 1 mm. long; perianth globose, 1—2 mm. in diam., glabrous, black-dotted, teeth 3—4 triangular; andrœcium sessile, turbinate, depressed, 1.5 mm. in diam., 1 mm. high; anthers about 13—15, much incurved at the apex: ♀ not known. *Fruit* unknown. *Myristica grandis*, Hook. f. in Trans. Linn. Soc. xxiii, 157 (1860). *M. rubiginosa*, King Ann. Calc. III. 302, t. 130.

SINGAPORE: in dense forest, *King's Collector* 1233!; in garden jungle, *Ridley* 4132!—DISTRIB. Borneo.

7. *HORSFIELDIA TOMENTOSA*, Warb. Monog. Myrist. 302 (1897). A tree, reaching 9—18 m. or more in height and about 45 cm. in diam. of stem; branches spreading; branchlets rather slender, rusty-stellate-tomentose as are the undersurfaces of the leaves and the inflorescence branches; leaf-buds lanceolate, about 1 cm. long. *Leaves* submembranaceous or rather thicker; elliptic or elliptic-obovate or oblanceolate, acute or abruptly acuminate at apex, cuneate, attenuate or sometimes rounded or even subcordate at base; upper surface glabrous, dull brown when dry, lower reddish-brown, glabrescent when old; 12—25 cm. long, 5—9 cm. broad; midrib rather slender; main nerves 12—15 pairs, straight at first, curved near the margin, slightly prominent on both surfaces; reticulation obscure; petiole about 15 mm. long, slender. *Flowers*: ♂ in many-branched many-flowered panicles up to 10 cm. long; branches spreading, laxly rufous-tomentose, ending in densely-flowered cymules; pedicels 1—1.5 mm. long, slender; perianth depressed-globose, thin, glabrous, 2—2.5 mm. in diam., divided halfway into 3—4 broad triangular acute teeth; andrœcium sessile, depressed-globose, 2 mm. in diam., 1 mm. high; anthers 10—15, much incurved at either end; ♀ not known,

the young fruits in short solitary 8—10-flowered racemes. *Fruit* in lax racemes of 3—5, 2—2.5 cm. long, ovoid, slightly flattened, ridged along the suture, subglabrous; pericarp fleshy; pedicel about 6 cm. long. *Seed* ovoid; testa crustaceous, shining; arillus fleshy, entire, not lacinate or areolate, embracing the whole seed. *Myristica tomentosa*, Hook. f. and Th. Fl. Ind. 161 (1855); Hook. f. Fl. Br. Ind. V. 105; A. DC. in Prodr. XIV. 204; Miq. Fl. Ind. Bat. I. 2. 68; King Ann. Calc. III. 301, t. 129. *Myristicaceae*, Wall. Cat. 9025. *Myristica Horsfieldia*, Wall. Cat. 6806 (*in part*).

KEDAH: at Yan, *Ridley* 5489!. PENANG: *Porter* (Wallich 9025!); *Phillips*!; at Pulau Boetong, *Curtis* 1197!. 1748!; *Ridley* 7205!, 10240!, 10787!. SELANGOR: at Weld's Hill, *Burn-Murdoch* 44!. PERAK: in bamboo and other forest up to about 250 m. alt., *King's Collector* 4165!, 5671!, 6102!, 7998!, 8642!, 10336!, 10557!. MALACCA: *Maingay* K.D. 1284; at Sungei Jernoh, *Derry* 967!; at Chaban Woods, *Ridley* 3171!.

8. *HORSFIELDIA WALLICHII*, Warb. Monog. Myrist. 305 (1897). A large tree, reaching a height of 30 m. or more and 60—80 cm. in diam. of stem; branchlets stout, rough, with dark grey channelled bark, the youngest minutely rusty-tomentose; leaf-buds lanceolate, 1—2 cm. long. *Leaves* coriaceous; oblong and acute at apex or rarely elliptic and blunt, the base rounded, subtruncate or subcordate; upper surface shining, greenish-brown, glabrous, lower rufous-brown, loosely and deciduously stellate-tomentose; margins revolute; oblong forms 25—35 cm. long and 7—11 cm. broad, elliptic forms 15—20 cm. long and about 10 cm. broad; midrib stout, flattened or somewhat channelled above; main nerves 18—22 pairs in the oblong, 10—12 in the elliptic forms, stout, impressed above, straight at first, curved and looped together near the margin; transverse nervules arched, visible on the lower surface; reticulation obscure; petiole 1—2 cm. long, stout, channelled. *Flowers*: ♂ in long stout spreading many-flowered rufous-tomentose panicles 10—30 cm. long from the axils of the leaves or of fallen leaves; branches thick, with subumbellate cymes, pedicels very short, tomentose; perianth fleshy, glabrous, globose, 2—3 mm. in diam., teeth 3—4, triangular, acute; andræcium sessile, ovate or obovate-globose, depressed at apex, 2 mm. high; anthers about 15, incurved, confluent: ♀ in panicles like the ♂ but stouter, shorter and fewer-flowered, the flowers larger: perianth coriaceous, tomentose externally at the base otherwise glabrescent; teeth 3, spreading; ovary

globose, sessile, glabrous; stigma sessile, small, linear. *Fruit* (quite young) ovoid, smooth, on a short stout pedicel, the slightly enlarged perianth persistent at the base, (old) obovoid, finely rugose, 5—6 cm. long, 3—5 cm. in diam. *Myristica Wallichii*, Hook. f. and Th. Fl. Ind. 161 (1855); A. DC. Prodr. xiv. 203; Miq. Fl. Ind. Bat. I. 2, 67; Hook. f. Fl. Br. Ind. V. 105; King Ann. Calc. III. 303, tt. 132, 133 (excl. syn. *crassifolia*, Hook. f. and Th.). *M. Horsfieldia*, Wall. (not of Bl.) Cat. 6806, *in part*.

PROVINCE WELLESLEY: at Kubang Ulu, *Curtis* 2423! PERAK: *Scortechini* 246!; in hilly forest near Goping at 150—250 m. alt., *King's Collector* 4837!. MALACCA: *Maingay* K.D. 1284! SINGAPORE: *Wallich*, 6806, *in part*!; *Murton* 1481!; *Maingay* K.D. 1283!; at Taunglin and Chanchukang, *Ridley* 4422!, 5060!.

The description of the old fruit is taken from *Ridley* 4422, a specimen which probably neither *King* nor *Warbug* had seen when they wrote their monographs.

9. *HORSFIELDIA AMYGDALINA*, Warb. Monog. Myrist. 310 (1897). A glabrous tree; branchlets terete, nearly glabrous, with white lenticels usually conspicuous. *Leaves* pergamaceous; elliptic-oblong, acute, scarcely acuminate, at both ends; blackish-brown above when dry, reddish-brown beneath; 12—18 cm. long, 3—7 cm. broad; main nerves 8—12 pairs, hardly conspicuous, somewhat parallel and curved near the margin, impressed above; transverse nervules and reticulation obscure; petiole about 12 mm. long, channelled. *Flowers*: ♂ in loose branching panicles from the axils of the leaves or of fallen leaves, 8—10 cm. long; rhachis fulvous-puberulous; bracts lanceolate, acute, early caducous; perianth in bud globose, 1—1.5 mm. in diam., 2—3-lobed; andrœcium 1 mm. long, globose, sessile; anthers 12—15, erect, incurved at the apex; ♀ not known. *Fruit* on thick peduncles, 3—4 cm. long, 2—3 cm. broad; pericarp thick, fleshy, the valves subacute when dry. *Seed* ovate, smooth, shining; the arillus complete or more or less distinctly and very shortly lacinate at the apex; albumen ruminant. *Myristica amygdalina*, Wall. Cat. 6797 (1828) and Pl. As. Rar. I. 79, t. 90; A. DC. in Prodr. xiv. 1. 203; Hook. f. and Th. Fl. Ind. 160 (excl. syn. *exaltata*, Wall.); Hook. f. Fl. Br. Ind. V. 106, (excl. syn. *exaltata*, Wall.); Kurz For. Fl. Burma II. 283; King Ann. Calc. III. 300, t. 125 *in part*. *M. floribunda*, Wall. Cat. 6805. *M. integra*, Wall. Cat. 6799. *M. glabra*, Hook. f. and Th. l.c. 161 *in part*; A. DC. l.c. 202 *in part*; Hook. f. l.c. *in part*; King l.c. 310, t. 142. *M. sucosa*, King t. 172, figs. 2, 5, 6, 7.

PENANG: *Curtis*. SINGAPORE: *Murton* 76!.—DISTRIB. Sylhet, Burma, Andamans.

There are no specimens in Hb. Calc. and *Murton's* is apparently the only one at Kew, the description has, therefore, been adapted from that of *Warburg*.

10. *HORSFIELDIA MAJUSCULA*, Warb. Monog. Myrist. 315 (1897). A tree, reaching 12—21 m. in height and 30—50 cm. in diam. of stem; branchlets stout, greyish-brown, rough, warted, glabrous except the rufous-puberulous extremities and lanceolate leaf-buds. *Leaves* coriaceous, glabrous; elliptic or elliptic-obovate, acute or shortly acuminate at apex, cuneate at base; upper surface pale, greenish-brown when dry, dull, lower bright reddish-brown; margins revolute; 18—25 cm. long, 4—8 cm. broad; midrib stout, usually slightly keeled above, prominent and often rufous-puberulous beneath; main nerves 10—15 pairs, spreading, raised and keeled above, raised beneath, interarching within the margin at about 5 mm. from it; transverse nervules few, obscure on the upper, faint on the lower surface; petiole stout, 12—18 mm. long, channelled above. *Flowers*: ♂ in lax much branched panicles up to 8 cm. long and 6 cm. broad from the axils of fallen leaves, wide at the base and narrowing upwards, the main rhachis stout, angular, scurfy; branches ending in few-flowered cymules; pedicels short; buds globose, 1—2 mm. in diam.; perianth thick, leathery, rugose, glabrous, with 3—4 triangular teeth; androecium nearly sessile, trigonous, depressed; anthers about 10—13, narrow, attached at the sides, free at the apex: ♀ in shorter, less branched stouter panicles; perianth ovoid, 2 mm. in diam., rough; ovary subglobose; stigma conical. *Fruit* yellowish-red, on the branches below the leaves, in pairs or solitary, broadly ovoid, obtuse but slightly pointed when young, glabrous, 4.5 cm. long, 4 cm. in diam.; pericarp thickly leathery. *Seed* ovoid, faintly reticulate, smooth; arillus fleshy, entire, covering the whole seed and overlapping at the apex. *Myristica majuscula*, King Ann. Calc. III. 310, t. 143 (1891).

PERAK: at elevations up to 600 m. alt., *King's Collector* 5059!, 6004!, 7965!; at Thaipeng, *Wray* 122!, 2705!, at Waterfall Hill, *Wray* 2064!, 2218!; *Scortechini* 837!. SINGAPORE: at Bajan, Bukit Timah, &c., *Ridley* 4439!, 5971!, 6448!, 6449!, 6451!.

11. *HORSFIELDIA IRYA*, Warb. Monog. Myrist. 371, t. xxii (1897). A large tree, reaching 12—18 m. in height; branches spreading; branchlets stout, greyish-brown, lenticellate, with prominent

pairs of raised ridges joining the bases of the leaf-scars, the uppermost dark brown, glabrous; leaf-buds linear-lanceolate. *Leaves* membranous, glabrous; oblong-lanceolate, acuminate at apex, cuneate at base; upper surface dull greenish-brown when dry, lower paler not greenish; 14—20 cm. long, 4—6 cm. broad; midrib rather prominent; main nerves 10—20 pairs, slender, at first straight, curved near the margin and sometimes looped; transverse nervules few, obscure as is reticulation; petiole about 1 cm. long. *Flowers*: ♂ minute, yellow, in axillary glabrous or minutely rufous-pubescent scurfy, many-flowered panicles 6—10 cm. long; branches slender, ending in glomerulate clusters of flowers; bracts oblong, scurfy, dotted, 1—2 mm. long, early caducous; pedicels slender, 1—2 mm. long; buds globose, 1 mm. in diam.; perianth very thin, bivalved; andrœcium broadly obovate, flat-topped, slightly elongate transversely; anthers about 6—10, free except at base, incurved at the apices: ♀ in smaller panicles than the ♂, 4—5 cm. long, the flowers fewer and larger; perianth obovoid, bivalved, thick; ovary glabrous, sessile, globular; stigma small, subterminal. *Fruit* solitary or in scanty racemes, globose, about 2 cm. in diam., glabrous; pericarp yellow, thick, coriaceous. *Seed* spherical; arillus red, thin, fleshy, completely enveloping the seed, entire or slightly cleft at the very apex, the lobes overlapping. *Myristica Irya*, Gaertn. Fruct. I. 195, t. 41 (1788); Poiv. Encyc. Meth. Dict. xii. 36; Lam. III. t. 833, 3; Hook. f. and Th. Fl. Ind. 159; A. DC. in Prodr. xiv. i. 202 (excl. syn. *M. exaltata*, Wall.); Miq. Fl. Ind. Bat. I. 2. 64; Bedd. Forest Man. 176; Kurz For. Fl. II. 282; de Vriese Pl. Reinw. 95; Thwaites Enum. Pl. Ceyl. 11; Trimen Fl. Ceyl. II. 435; Hook. f. Fl. Br. Ind. V. 109 (excl. syn. *M. exaltata*, Wall.); King Ann. Calc. III. 309, tt. 141, 141 bis; Brandis Ind. Trees 525; Koord. and Val. Bijdr. IV. 184. *M. javanica*, Blume Bijdr. 576 and in Rumphia I. 190, t. 62. *M. sphaerocarpa*, Wall. Pl. As. Rar. I. 79, t. 89; Wall. Cat. 6796. *M. exaltata*, Wall. Cat. 6804 in part. *M. micrantha*, Wall. Cat. 6807. *M. Vriesiana*, Miq. Ann. Mus. Bot. Lugd.-Bat. II. 49.

PENANG: at Pulau Boetong, *Curtis* 936!. MALACCA: *Griffith*, K.D. 4357!; *Maingay* K.D. 1291!. 1292!. PERAK: at Krian, etc., *Scortechini* 1738!; *King's Collector* 7447!; at Bruas Dindings, *Ridley* 7206!. DINDINGS: at Pulau Sembilan, *Ridley* 3043!. JOHORE: at Sungei Panh, *Ridley* 11328!. SINGAPORE: on Pulau Buru, *Ridley* 1701!; Changi, *Ridley* 4814!; in garden jungle, *Ridley* 8857!.—DISTRIB. Java, Sumatra (*Forbes* 3197!), Ceylon, Burma, Andamans, Borneo.

12. *HORSFIELDIA SUCOSA*, Warb. Monog. Myrist. 322 (1897). A large tree, reaching a height of from 18 to 30 m. and a diam. up to nearly 1 m.; branches spreading; branchlets stout with rather rough greyish-brown bark, the uppermost together with the lanceolate leaf-buds and the surfaces of the youngest leaves covered with minute deciduous scurfy tomentum. *Leaves* coriaceous; oblanceolate or obovate-lanceolate, acute or acuminate at apex, much narrowed at the base from the middle downwards; both surfaces glabrous, dull, the lower paler than the upper when dry; margins revolute; 12–25 cm long, 5–7 cm. broad; midrib conspicuous, especially beneath; main nerves 9–14 pairs, inconspicuous and slightly impressed on the upper, prominent and minutely winged on the lower surface; reticulation obscure; petiole 1–2 cm. long, bordered by the decurrent margins of the blade. *Flowers*: ♂ numerous in branching panicles from the branchlets below the leaves, 8–13 cm. long, the rhachises zigzag, angular, the branches scurfy, ending in subumbellate cymules; pedicels slender 3–5 mm. long; perianth thin, globular, 2–3 mm. in diam., puberulous without, glabrous within with vertical nerves, teeth 2–3, triangular, short; androecium sessile, subglobular; anthers about 10, connate at the sides, the apices free, incurved: ♀ in axillary stout, rigid, spreading, rusty-puberulous panicles 3–4 cm. long and about 3 cm. broad; perianth ovoid-globose, glabrous, fleshy, with 3 short triangular teeth; ovary sessile, ovoid-globose, glabrous; stigma sessile, grooved, prolonged on one side. *Fruit* solitary or 2–3 in a raceme, when ripe ovoid or pyriform, very succulent, glabrous, 6–7.5 cm. long, 4–5 cm. in diam.; peduncle woody, about 4 cm. long; pericarp 12–13 mm. thick. *Seed* ovoid, about 3–4 cm. long; arillus fleshy, yellow, enveloping the whole of the seed, slightly lacinate and conduplicate at the apex, otherwise entire. *Myristica sucosa*, King Ann. Calc. III. 301, t. 172 (1891) in part (figs. 1, 3, 8, 9).

PROVINCE WELLESLEY: at Krian, *Ridley* 9461!. PERAK: at Gunong Batu Pateh lower camp at about 1000 m. alt., *Wray* 467!; in forest to about 300 m. alt. near Larut Goping and Ulu Bubong, *King's Collector* 4078!, 4647!, 10475!. MALACCA: *Maingay* K.D. 1300!. SINGAPORE: *Ridley* 6559!, 11355!.

13. *HORSFIELDIA CRASSIFOLIA*, Warb. Monog. Myrist. 323 (1897). A tree reaching a height of 18 to 24 m. and 45–60 cm. in diam. of stem; branchlets robust, rough, dark-brown, lenticellate, uppermost puberulous as are the linear-lanceolate leaf-buds. *Leaves* coriaceous, glabrous when old, rufous-tomentose beneath when young; elliptic-



oblong, rather wider in the lower half, obtuse at apex, slightly and suddenly cuneate at base, otherwise rounded; upper surface dull, greenish when dry, with scattered shallow pits, lower reddish-brown, dull, subglaucous; margin slightly revolute; 16—22 cm. long, 7—9 cm. broad; midrib stout, channelled and keeled above, prominent and rough beneath; main nerves 12—15 pairs, impressed above when dry, rather prominent beneath, at first straight and parallel, curving and interarching near the margin; reticulation very obscure; petiole very stout, 2 cm. long. *Flowers*: ♂ in spreading rufous-tomentose panicles 6—12 cm. long, 5—7 cm. broad, from the axils of the leaves or of fallen leaves; branches many, ending in many-flowered rather dense clusters; bracts ovate or obovate, scurfy, 2—3 mm. long, caducous, but a few persisting till the flower opens; pedicels 1—1.5 mm. long; buds globose, 1—1.5 mm. in diam.; perianth bivalved, the valves thin, rugose outside; androecium sessile, flattened, elongated transversely; anthers 6—10, partially attached to the column but easily separable, slightly incurved at tip: ♀ in stout scurfy panicles up to 8 cm. long, 5 cm. broad, the pedicels very thick 2.5 mm. long; buds globose, 3—3.5 mm. in diam., vertically furrowed; perianth bivalved, very thick; ovary depressed globose, with sessile bilobed stigma. *Fruit* yellow, in panicles 5—7 cm. long of about 4—6, 2 cm. long, 1.5 cm. diam., ovoid, the rhachis and peduncles very thick, angular, rugose, the perianth-lobes persistent, reflexed; pericarp thick, minutely rugose when dry, splitting down one side. *Seed* ovoid, smooth; arillus thin, fleshy, covering nearly the whole seed, lacinate only at the apex. *Myristica crassifolia*, Hook. f. and Th. Fl. Ind. 160 (1855); A. DC. Prodr. xiv. i. 204; Miq. Fl. Ind. Bat. I. 2. 68; Hook. f. Fl. Br. Ind. V. 108; King Ann. Calc. III. 308, t. 140, t. 172, fig 4. *M. Irya* var. *crassifolia*, Miq. in Herb. *M. Horsfieldii*, Blume?, Wall. Cat. 6806 (in part).

PERAK: in dense forest on low wet ground up to 300 m. alt., *King's Collector* 6688!. MALACCA: *Griffith* K.D. 4350!; *Cantley*; at Sungei Hudang, *Derry* 1163!. SINGAPORE: *Wallich* 6806 in part; *T. Anderson* 9!; at Chanchukang, Bukit Mandai, and Bukit Timah, *Ridley* 361!, 1819!, 1828!, 3831!, 4132!, 5826!, 6909!, 8040!, 10695!. —DISTRIB. Bangka, Borneo, Amboina (*De Vriese* 22!).

The ♀ flowers have been described from *Ridley's* No. 10695, the fruit from *Kunstler's* 6688 and *Ridley's* specimens, the identification of which there seems no reason to doubt. I have not quoted *King's Collector* 10413 and some others admitted by Warburg as I think they belong probably to *H. sucosa*.

#### 14. *HORSFIELDIA BRACHIATA*, Warb. Monog. Myrist. 325 (1897).

A tree reaching 20—30 m. in height; branches spreading, pendulous; branchlets stout, glabrous, brown, lenticellate, with prominent pairs of raised ridges joining the bases of the leaves or leaf-scars, innovations and lanceolate leaf-buds rusty-pubescent. *Leaves* chartaceous, glabrous; oblong-lanceolate or -elliptic, acuminate, sometimes abruptly, at apex, acute or rounded or even sometimes subcordate at base; both surfaces dull, the upper olivaceous, the lower reddish-brown when dry; 18—25 cm. long, 6—10 cm. broad; midrib moderately stout, flattened and slightly keeled above, prominent and scurfy-puberulous beneath; main nerves 15—20 pairs, raised on both surfaces, spreading and joining in loops near the margin; transverse nervules distant, arched, visible on lower surface only; petiole 6—8 mm. long, thick. *Flowers*: ♂ in slender, much-branched, spreading, many-flowered panicles from the axils of the leaves or of fallen leaves, 10—15 cm. long and about as much broad; rhachis rusty-puberulous to glabrescent; branches ending in subumbellate cymules; pedicels about 1.5—2 mm. long; perianth leathery, 1—1.5 mm. in diam., teeth 3, triangular; androecium subsessile, sharply trigonous; anthers about 9, slightly attached at the sides, the apices free: ♀ in spreading panicles 10—15 cm. long, rhachis rather thicker than in ♂, rusty-puberulous; branches at right angles bearing subumbellate cymes at the ends; pedicels thick, 2 mm. long; perianth leathery, 3 mm. in diam., teeth 3; ovary sessile, ovoid, ridged on one side; stigma short, oblique, 2-lobed. *Fruits* 6—8 together in woody spreading cymes from below the leaves, ovoid, 3 cm. long about 2 cm. in diam.; pericarp rather thin, glabrous. *Seed* ovoid, smooth; arillus covering the whole of the seed, slightly laciniate and overlapping at the apex. *Myristica brachiata*, King Ann. Calc. 311, t. 144 (1891). *M. Horsfieldia*, Wall. (non Bl.) Cat. 6806 in part. *M. polyspherula*, Hook. f. Fl. Br. Ind. v. 108 in part.

PERAK: in dense forest on low wet ground, King's Collector 4704!, 6771!; *Scortechini* 1649!. MALACCA: Griffith K.D. 4351!. SINGAPORE: *Ridley* 4439!.

15. *HORSFIELDIA LEMANNIANA*, Warb. Monog. Myrist. 326 (1897). A tree reaching 12—20 m. in height and 30—37 cm. in diam. of stem; branchlets dark brown, somewhat rough, the younger rusty-puberulous and scurfy, ultimately glabrous and striate. *Leaves* chartaceous, fragile when dry; oblong or oblong-lanceolate, acuminate at apex, cuneate to slightly rounded at base; upper surface pale greenish-brown when dry, glabrous, shining, lower surface dark

brown, dull, glabrous except the midrib; margin slightly revolute; 10–17 cm. long, 4–6 cm. broad; midrib slender, keeled above, scurfy-puberulous beneath; main nerves 10–15 pairs, thin but sharp and bold on both surfaces, subparallel, gently curving to near the margin and there joining in arches at 2–3 mm. from the edge; transverse nervules and reticulation obscure; petiole 8–12 mm. long, channelled. *Flowers*: ♂ in much-branched, spreading, rusty tomentose panicles from the axils of leaves and of fallen leaves 5–12 cm. long, 3–7 cm. broad; rhachis rusty-puberulous; branches ending in subumbellate cymes; bracts lanceolate, densely rusty-tomentose, quickly deciduous; pedicels about 1.5 mm. long; perianth globose, glabrous, black when dry, 1 mm. in diam., teeth 3, triangular; androecium sessile, 3-angled; anthers 9–12, ovate, free at the margins: ♀ in stout few-flowered rusty-pubescent panicles, 4 cm. in diam.; ovary sessile, ovoid, glabrous; stigma sub-bilobed. *Fruit* in short racemes of 2–3, pedunculate, ovoid, narrowly ridged on one side, glabrous, 2 cm. long, 1–5 cm. in diam.; pericarp coriaceous. *Seed* ovoid, smooth, shining; arillus completely covering it. *Myristica Lemniana*, A. DC. in Ann. Sc. IV. 31, t. 4, and Prodr. xiv. 203; Miq. Fl. Ind. Bat. I. 2. 66. *M. globularia*, Hook. f. and Th. Fl. Ind. 180; A. DC. Prodr. xiv. i. 202 in part. *M. polyspherula*, Hook. f. Fl. Br. Ind. v. 108; King Ann. Calc. 312, t. 146.

PERAK: in dense forest at 150–300 m. alt., Ulu Bubong, etc., *King's Collector* 3309!, 5536!, 7526!, 10256!, 10431!, 10513!; at Goping, *Scortechini* 211!; at Thaiping, *Wray* 2088!. MALACCA, *Griffith* K.D. 4351!; *Maingay* K.D. 1286!; at Bukit Panchur and Merliman, *Derry* 1136! and 1216!. SINGAPORE: at Jurong, Chanchukang, and Bukit Timah, etc., *Ridley* 2042!, 2108!, 4438! 8930!; at Bukit Timah, *Hullett* 209!.

16. *HORSFIELDIA SUBGLOBOSA*, Warb. Monog. Myrist. 328, t. xxi. (1897). A tree reaching 12–24 m. in height; branches spreading; branchlets brown, striate, rusty-pubescent and scurfy when young, glabrous when old, faintly 2-ridged between the leaves or leaf-scars. *Leaves* stiffly chartaceous, fragile when dry; elliptic-oblong, acuminate at apex, cuneate or sometimes rounded at base; upper surface glabrous, pale, olivaceous-brown when dry, lower surface reddish-brown except the deciduously pubescent midrib; margins recurved; 15–26 cm. long, 5–7 cm. broad, broadest in the middle; midrib slender, keeled on the upper surface; main nerves 13–17 pairs, subparallel, raised on both surfaces, nearly straight to join in arches at

about 4 mm. from the edge; transverse nervules and reticulation obscure; petiole stout, 8—12 mm. long, bordered by the decurrent margins of the blade. *Flowers*: ♂ in axillary, lax, spreading panicles 4—8 cm. long; rhachis slightly scurfy-pubescent especially when young; pedicels 1—1.5 mm. long, glabrous; perianth globose, glabrous, scarcely 1 mm. in diam. with 3 acute triangular teeth; androecium transversely ovoid, compressed or 3-angled, anthers about 10 attached only by their bases, the margins free: ♀ in shorter panicles, 2—3 cm. long, subglabrous, sparingly branched; pedicels thick; perianth subglobose, 1—1.5 mm. in diam., shortly 3-toothed; ovary depressed-globular, glabrous, with small oblique stigma. *Fruit* solitary or in racemes of 2 or 3, ovoid-globose, glabrous; 3.5—4 cm. long, 2.5—3 cm. in diam.; pericarp yellowish red, thickly coriaceous. *Seed* globose, smooth; arillus rather thick, entire, covering the testa completely. *Myristica subglobosa*, Miq. Fl. Ind. Bat. Suppl. 383; Ann. II. 49. *M. globularia*, Bl. and *subglobosa*, Miq. in Ann. I. 206. *M. glabra*, Miq. Fl. Ind. Bat. I. 2. 65 in part. *M. glabra*, Miq. var. *sumatrana* in Ann. II. 49. *M. Collettiana*, King Ann. Calc. III. 313, t. 147.

PERAK: in forests up to 450 m. alt., *King's Collector* 3620!, 3899!, 6566?!, 6672!, 6737!. JOHORE: Road to Gunong Palai, *Ridley* 12155!.—DISTRIB. Sumatra.

17. *HORSFIELDIA RIDLEYANA*, Warb. Monog. Myrist. 231 (1897). A tree, reaching 12—18 m. in height and up to 30 cm. or more in diam. of stem; glabrous except the panicle and leaf-buds, branchlets slender, dark brown, with very faint pairs of ridges from the bases of the leaf-scars; innovations rusty-puberulous. *Leaves* chartaceous; lanceolate, acuminate at apex, cuneate at base; upper surface greenish when dry, lower bright brown; 7—13 cm. long, 2.5—4.5 cm. broad; midrib slender, slightly impressed above; main nerves 7—10 pairs, inconspicuous, spreading; petiole 1—1.5 cm. long, channelled above. *Flowers*: ♂ in spreading scurfy or almost glabrous panicles from the axils of leaves or of fallen leaves, up to 6 cm. long; rhachis angular; branches short, ending in subumbellate cymes; pedicels 1.5—2 mm. long, slender; perianth thick, globose, 1—1.5 mm. in diam., teeth 3—4, triangular, acute; androecium sessile, trigonous, with 7—10 suberect anthers attached at their bases, free at their margins and apices: ♀ in short racemes, 1.5—2 cm. long; perianth thick, globose, 1.5—2 mm. in diam., the teeth short; ovary sessile, glabrous, grooved, with an oblique grooved stigma. *Fruit* (young) solitary or

in short racemes of 2—4, ellipsoid. 1—2 cm. long, 10—15 mm. in diam.; pedicel 5 mm. long, stout; pericarp thick, glabrous, leathery. *Seed* oval, smooth; arillus thin, quite entire and completely covering the seed. *Myristica Ridleyana*, King Ann. Calc. III. 311, t. 145 (1891).

PERAK: at elevations from 180—240 m. alt., *King's Collector* 10917!; at Haram, *Scortechini* 862!. SUNGAI UJONG: *Cantley* 1798.

HORSFIELDIA SYLVESTRIS, Warb. Monog. Myrist. 337, t. xii (1897). *Myristica sylvestris*, A. DC. Prodr. xiv. 1. 193; Miq. Fl. Ind. Bat. I. 2. 61. *M. pendulina*, Hook. f. in Fl. Br. Ind. V. 859; King Ann. Calc. 329, t. 170 is represented in the Kew and Calcutta Herbaria by specimens collected in Singapore by *Ridley* (No. 186) and *Cantley*. The former is labelled 'from the Gardens' and it seems very probable that *Cantley's* specimen (also ♀) is similarly from a cultivated tree. Warburg believes that it is only a cultivated plant in Singapore as it also is in Java. I, therefore, content myself with this note and do not give a description.

18. HORSFIELDIA RACEMOSA, Warb. Monog. Myrist. 347 (1897). A tree, 9—12 m. in height; young branches thin, glabrous, dark-coloured, older ones striate, polished. *Leaves* thinly coriaceous; elliptic to elliptic-oblong, subacute or shortly and abruptly acuminate at apex, rounded or subcuneate at base; glabrous on both surfaces, the upper shining, the lower dull and paler; 15—25 cm. long, 5—8 cm. broad; main nerves 12—16 pairs, slightly prominent on the upper, very prominent on the lower, surface, straight and faintly inter-arching near the margin; transverse nervules and reticulation only slightly visible on the lower surface; petiole about 1.5 cm. long, channelled. *Flowers* not known. *Fruit* in lax glabrous racemes, 25—40 cm. in length, ovoid, slightly oblique, pointed, about 5 cm. long, 3 cm. broad; pericarp thickly leathery, glabrous. *Seed* smooth, ovoid, pointed; arillus fleshy, red, completely enveloping the testa, shortly fimbriate at the apex. *Myristica racemosa*, King in Calc. Ann. 328, t. 173.

PENANG: pass to Ralan, *Curtis* 934!. SINGAPORE: Bukit Timah, *Ridley* 6355!.

Warburg thinks that this species is most probably referable to either *H. Prainii* of the Andaman Islands or *H. canarioides*, and I cannot help thinking he is right, especially in regard to the latter-mentioned.

## 2. GYMNACRANTHERA, Warb.

Diœcious trees with evergreen pergamaceous glabrous leaves, reddish-white beneath, the main nerves confluent near the margin,

the transverse nervules obscure. *Inflorescence* of axillary panicles, the flowers fasciculate; bracts at the bases of the pedicels caducous; flowers small, urceolate, pedicellate; bracteoles 0; perianth 3—4-toothed. *Andræcium* sessile; filaments combined in an oblong thick column; anthers 6—12, elongate, the lower parts adnate to the column by their backs, the apices free, often inflexed and covering almost the whole column. *Stigmas* sessile, connate, scarcely bilobed. *Fruit* globose or ovoid; pericarp thick, fleshy; arillus laciniate almost to the base. *Seed* conform to the fruit; testa woody; albumen ruminate; cotyledons divaricate, connate at the base.—*DISTRIB.* S. Asia from India to the Philippines and New Guinea, species 11.

♂ flowers 4 mm. long, thickly rusty-tomentose, as is the undersurface of the leaves when young; leaves 20—35 cm. long. . . . . 1. G. MURTONI.

♂ flowers at most 3 mm. long, almost glabrous; the undersurface of fully-developed leaves glabrous.

Main nerves of the leaves strongly prominent beneath; leaves usually longer than 15 cm. . . . 2. G. FORBESII.

Main nerves of the leaves only slightly prominent beneath; leaves usually under 15 cm. . . . 3. G. FARQUHARIANA.

1. *GYMNACRANTHERA MURTONI*, Warb. Monog. Myrist. 357, t. xx. (1897). A tree reaching 25 m. in height; branchlets stout, densely covered with very short rufous tomentum beneath which they are minutely lenticellate and striate; leaf-buds densely rufous-tomentose. *Leaves* coriaceous; elliptic-ovate, shortly and abruptly acuminate at apex, broadly rounded and often emarginate at base; upper surface glabrous, shining, lower covered with deciduous rusty tomentum, finally glabrous and subglaucous; margins slightly revolute; 20—35 cm. long, 7—12 cm. broad; midrib stout, broad above, prominent beneath; main nerves 20—22 pairs, parallel, subhorizontal, at first straight, curving and inter-arching near the margin; transverse nervules irregular, subparallel; reticulation obscure; petiole 1—2 cm. long, stout, rugose, channelled above. *Flowers*: ♂ in axillary densely silky, rufous-tomentose panicles up to 8 cm. long; branches spreading, many-flowered; buds ovoid, 3—4 mm. long; pedicels very short; perianth leathery with 2 or sometimes 3 teeth, tomentose without, less so within; andræcium sessile, broadly ovoid, obtuse at apex; anthers about 7—10, narrow, elongate, their apices free and acuminate: ♀ very short, axillary, few-flowered, pedicels short. *Fruit* ovoid, flattened, acute at apex, obtuse at base, densely covered with rufous tomentum, 2.5 cm. long, 1.5 cm.



broad splitting into two valves; pericarp coriaceous, 2 mm. thick. *Seed* (immature) ovoid; arillus longer than the seed and deeply lacinate, thin. *Myristica Murtoni*, Hook. f. Fl. Br. Ind. V. 105; King Ann. Calc. III. 297, t. 124 *ter.* *M. ferruginea*, Wall. Cat. 6803; King l.c. 298, t. 125.

SINGAPORE: *Wallich* 6803!; at Selitar, *Ridley* 1835!, 4815!; at Sungei Morai, *Ridley* 3890!.

2. GYMNACRANTHERA FORBESII, Warb. Monog. Myrist. 363, t. xx. (1897). A tree, reaching 18—24 m. in height and 60—90 cm. in diam. of stem, glabrous except the rufous-tomentose lanceolate leaf-buds and puberulous inflorescence; branchlets slender, pale brown, smooth, with minute lenticels. *Leaves* chartaceous or thinly coriaceous; oblong-lanceolate or -oblanceolate, acuminate at apex, cuneate or somewhat rounded at base; both surfaces when dry somewhat purplish-brown, the upper shining, the lower glaucous; 15—25 cm. long, 5—10 cm. broad; midrib rather stout, impressed above, prominent beneath; main nerves 13—17 pairs, thin but distinct beneath, sub-horizontal to ascending, inter-arching within (5 mm. from) the margin in rather prominent loops; secondary nerves and transverse nervules few; reticulation obscure; petiole about 10—15 mm. long, channelled above. *Flowers*: ♂ in spreading panicles 5—6 cm. long from the axils of the leaves or of fallen leaves; branches short, many-flowered, bearing umbellate cymules, in subglobular clusters; pedicels slender, 2 mm. long; perianth at first ovoid, afterwards urceolate, 3·5—4 mm. long; teeth 3—5, reflexed, nearly as long as the tube, acute; andrœcium sessile, 2 mm. high, subquadrangular; anthers 6—10, free at the apex and sides, twisted: ♀ in condensed panicles, fewer-flowered than in ♂ and under 2·5 cm. long; perianth scurfy-pubescent within; teeth acute; ovary sessile, ovoid, scurfy-pubescent; stigma oblique. *Fruit* in racemes 3—12, when young subglobular, when ripe narrowly obovoid, grooved, slightly scurfy, 2—2·5 cm. long, 12 mm. in diam.; peduncle rather stout, thickened upwards, 8—10 mm. long; pericarp yellow to red, coriaceous. *Seed* smooth, ellipsoid or slightly obovoid; arillus extending to the apex of the seed, thin, pale, fleshy, divided to the base into many narrow segments. *Myristica Forbesii*, King Ann. Calc. III. 306, t. 137.

PENANG: Government Hill, *Maingay* 1293!. PROVINCE WELLESLEY: at Krian, *Ridley* 9464!. PERAK: common at elevations up to 250 m. alt., *King's Collector* 3783!, 6591!, 6784!, 6973!, 7419!.

7645!, 7732!, 8159!, 8722!, 8756!, 10080!; at Tapa, Wray 1429!.  
 NEGRI SEMBILAN: at Tampur, *Goodenough* 1845!. MALACCA: *Main-  
 gay* K.D. 1295; at Ayer Panas, *Holmberg* 818!; at Kesang Tua and  
 Sungei Hudang, *Goodenough* 1317!, 1355!. SINGAPORE: at Selitar,  
*Ridley* 6270!.—DISTRIB. Sumatra (*Forbes* 2976!, 3061!).

3. GYMNACRANTHERA FARQUHARIANA, Warb. Monog. Myrist.  
 365, t. xx. (1897). A tree reaching 20—30 m. in height and up to  
 about 90 cm. in diam. of stem; branches spreading; branchlets  
 slender, at first rusty-puberulous, afterwards paler, often slightly  
 lenticellate; leaf-buds linear-lanceolate, about 5 mm. long. *Leaves*  
 subcoriaceous, glabrous; lanceolate, oblong-lanceolate or slightly  
 oblanceolate, acuminate at apex, cuneate at base; upper surface  
 shining, brown when dry, lower pale, purplish-brown, glaucous;  
 margins revolute; 7—15 cm. long, 2—4 cm. broad; midrib slender,  
 slightly impressed above, prominent and dark beneath; main nerves  
 6—10 pairs, usually indistinct, only slightly inter-arching; reticula-  
 tion obscure; petiole about 1 cm. long, channelled above. *Flowers*:  
 ♂ in spreading rusty-puberulous panicles 2.5—4 cm. long and 2.5  
 cm. broad from the axils of the leaves or of fallen leaves; pedicels  
 1.5—2 mm. long, puberulous; cymules umbellate, 6—10-flowered;  
 perianth ovoid, inflated, 2.5—3.5 mm. long, puberulous outside and  
 inside, the inside also with numerous vertical lines; teeth 3 or 4,  
 triangular, acute, nearly half the length of the perianth; andrœcium  
 cylindric, sessile, 1.5—2 mm. long; anthers 7—8, narrow, elongate,  
 the apices and edges free: ♀ in few-flowered short panicles, 2—2.5  
 cm. long, from the axils of fallen leaves; pedicels short; perianth  
 deeply 3—4-cleft, 2—2.5 mm. long, the lobes acute, their tips reflexed;  
 ovary sessile, ovoid-globose, tomentose; stigma sessile, transversely  
 2-lobed. *Fruit* in woody racemes of 2—5, ovoid, slightly pointed at  
 each end, faintly grooved on one side and ridged on the other, 1.5—  
 2 cm. long, 1—1.5 cm. in diam., rufous-pubescent, becoming glabrous  
 with age; peduncle 8—12 mm. long, stout; pericarp thick. *Seed*  
 ellipsoid, mottled, smooth; arillus thin, extending to the apex of the  
 seed, narrowly lacinate. *Myristica Farquhariana*, Wall. Cat. 6795;  
 A. DC. Prodr. xiv.; 200; Miq. Fl. Ind. Bat. I. 2. 63; Hook. f. &  
 Th. Fl. Ind. 161; Hook. f. Fl. Br. Ind. V. 108 (all in part, *Malay  
 Peninsula material only*); King Ann. Calc. III. 305, t. 136. *M.  
 eugenicefolia*, A. DC. l.c. 190; Miq. l.c. 58; Hook. f. l.c. 113; King  
 l.c. 330.

PENANG: *Curtis* 487, 804!, etc. PERAK: *Scortechini*!; at Tapa

and Waterfall Hill, *Wray* 1436!, 2034!; in hilly forests up to 900 m. alt., *King's Collector* 3833!, 4640!, 5408!, 5801!, 6141!, 6620!, 6631!, 6652!, 6932!, 7481!. SELANGOR: Batu Tiga, *Curtis* 3768!. MALACCA: *Maingay* K.D. 1290, 1293, 1302!, 1303!, 1306!; *Hervey*!. JOHORE: at Bukit Patani, *Ridley* 11029!. SINGAPORE: *Wallich* 6795!; *Caniley* 41; *Ridley* 2102!.

Var. major, *King*. Young branches rather darker than in the typical form; leaves 12—18 cm. long, larger than in the typical form and more glaucous beneath, the nerves more distinct on the lower surface; panicles of ♂ flowers rather long (6—8 cm.), the flowers larger (3.5—4 mm.); fruit larger, 2.5 cm. long, scarcely ridged on the side opposite the groove.

PERAK: in hill forests, *King's Collector* 6548!, 6622!, 6736!, 7928!; at Thaipeng, *Wray* 2399!, 2695!. MALACCA: *Griffith* K.D. 4355!. SINGAPORE: *Ridley* 102!, 3961!.

Var. *Griffithii*, Warburg. Leaves with more distinct nerves which are more oblique and interarch more conspicuously; male inflorescence less branching, nearly glabrous, the perianth scarcely half as big as in the type, 1.5—2 mm. in diam., glabrous within, andræcium smaller, ovoid-globular. *Myristica Griffithii*, Hook. f. Fl. Br. Ind. V. 109; *King Ann. Calc.* III. 305, t. 135.

PENANG: at Moniot's Road, etc., at 450 m. alt., *Curtis* 2406!, 2458!. MALACCA: *Griffith* K.D. 4356!.

### 3. MYRISTICA, Linn.

Dioecious trees with chartaceous or pergamaceous leaves, usually white or glaucescent beneath and often with a ferruginous tomentum; main nerves confluent near the margin; transverse nervules often subparallel, scarcely distinct. Inflorescence of cymes, umbels or few-flowered panicles, axillary or from the axils of fallen leaves; bracts caducous; flowers rather large, urceolate or campanulate rarely tubular, pedicellate; bracteoles persistent, usually oblique, at the base of the perianth; perianth 3-toothed. Andræcium stalked; filaments connate in a column often produced beyond the anthers; anthers 12—30, elongate, connate to the column and to each other. Stigmas connate, bilobed. Fruit large, ovoid or oblong; pericarp thick, succulent, rarely leathery; arillus laciniate almost to the base. Seed conform to the fruit; testa hard; albumen ruminant; cotyledons connate.—DISTRIB. South Asia from India to the Philippines, Polynesia and tropical Australia; species about 80.

Inflorescence branching, the ultimate branches bearing at least 3 flowers; leaves, at least when mature, glabrous beneath.

- ♂ perianth broadly ovoid or almost globose, 5—8 mm. long; ♂ inflorescence much longer than the petiole; fruit very large (8—12 cm. long, 3.5—4.5 cm. broad) .. .. 1. *M. MAXIMA*.

♂ perianth ovoid or ellipsoid.

Bracteoles of ♂ flowers large.

- Bracteoles broad, 4 mm. long; top of androecium free, glabrous; ♂ flowers 5 mm. long, 4 mm. broad; leaves lanceolate, 16—29 cm. long .. .. 2. *M. MAINGAYI*.

- Bracteoles narrow, 2 mm. long; top of androecium covered by the anthers; ♂ flowers 3—4 mm. long, 1.5—2 mm. broad; leaves linear or lanceolate, 8—11 cm. long .. 3. *M. GIGANTEA*.

Bracteoles of ♂ flowers small, rarely over 1 mm. long.

- ♂ flowers 3—4 mm. long; leaves oblong-lanceolate or oblanceolate under 18 cm. long, 4 cm. broad .. .. 4. *M. INERS*.

- ♂ flowers 2—2.5 mm. long; leaves oblong over 15 cm. long, 4 cm. broad .. 5. *M. MALACCENSIS*.

Inflorescence not branching or forked; leaves, when mature, glabrous beneath, sometimes a slight pubescence remaining.

Leaves beneath only slightly lighter in colour than above, not glaucous.

- Flowers narrowly urceolate, oblique, 8 mm. long, 4 mm. broad; bracteole on the pedicel 0.5 mm. below the perianth .. .. 6. *M. ELLIPTICA*.

- Flowers urceolate, not oblique; bracteole at the base of the perianth .. .. 7. *M. SUAVIS*.

- Flowers long elliptic, 5 mm. long, 2—3 mm. broad; bracteole at the base of the perianth 8. *M. CINNAMOMEA*.

Leaves beneath light coloured, mostly glaucous.

Peduncle of ♂ inflorescence slender, not woody, a ways under 3, mostly under 2 mm. thick.

- ♂ Perianth ovoid, rarely linear, 4—7 mm. long .. .. 9. *M. FRAGRANS*.

Peduncle of ♂ inflorescence very thick, usually woody; leaves on an average longer than 20 cm.

- Anthers 14—18; ♂ inflorescence up to 9 mm. long; fruit with close weak felt .. 10. *M. CRASSA*

- Anthers 10—14; ♂ inflorescence 3 mm. long; fruit thickly woolly .. 11. *M. LOWIANA*.

1. *MYRISTICA MAXIMA*, Warb. Monog. Myrist. 385 (1897). A tree reaching 24—30 m. in height and 90—120 cm. in diam. of stem; branches spreading; branchlets stout, smooth, lenticelled, glabrous; buds lanceolate, tawny. *Leaves* coriaceous; oblong, sometimes slightly obovate, shortly and rather abruptly acuminate at apex, rounded or subtruncate rarely cuneate at base; upper surface glabrous, shining, lower pale, glaucous, minutely adpressed-lepidote when young; margins recurved; 25—40 cm. long, 10—15 cm. broad; midrib very stout; main nerves 20—30 pairs, spreading or subhorizontal, inter-arching within the edge, prominent beneath, scaly when young, but ultimately glabrous; petiole stout, 2—3 cm. long. *Flowers*: ♂ in panicles, axillary or from the axils of fallen leaves, 10—17 cm. long; rhachis flattened, scaly; branches short, bearing subumbellate racemes of 4—6 flowers; pedicels slender, 1—2 cm. long; bracteole semi-annular or suborbicular, embracing half the base of the flower, 2 mm. long; perianth leathery, scaly-tomentose without, glabrous within, urceolate, 6 mm. long, 4 mm. broad, the mouth with 3 broadly triangular subacute teeth; androecium cylindrical, 4—5 mm. long, on a short thick stalk 1—2 mm. long, nearly as long as the perianth, the connectives connate in a cone at the apex; anthers 12—20 narrowly elongate: ♀ unknown. *Fruit* ellipsoid or oblong when ripe, blunt at the apex, slightly narrowed at base, minutely rufous-pubescent, sub-furfuraceous, 7—9 cm. long, 4—5 cm. in diam.; pericarp thickly coriaceous. *Seed* shining, conform to the fruit; arillus thin, fleshy, bright red, extending to the apex of the seed, lacinate and areolate. *M. bracteata*, King (non DC.) Ann. Clac. III. 286, t. 107.

PENANG: Government Hill 350 m., *Curtis* 1497!. PERAK: at low elevations on the hills near Larut, *King's Collector* 5513!, 6960!; at Larut, *Scortechini* 1872!. SINGAPORE: at Bukit Timah, *Ridley* 3363!—DISTRIB. Borneo (*Beccari* 1556!).

2. *MYRISTICA MAINGAYI*, Hook. f. in Fl. Br. Ind. V. 104 (1886). A tall tree reaching 9—18 m. in height and 45—60 cm. in diam. of stem; bark contracting in longitudinal ridges; branchlets rather stout, at first rusty-tomentose, afterwards glabrous with thin nearly black bark. *Leaves* coriaceous; linear-oblong, acute or acuminate at apex, acute cuneate or rounded at base; upper surface shining, lower dull, both glabrous, pale brown when dry; margins recurved; 13—20 cm. long, 4—5 cm. broad; midrib stout, slightly impressed and keeled above, prominent beneath; main nerves 16—18 pairs, im-

pressed above, slightly prominent beneath, evanescent towards the margin; transverse nervules rather obscure, impressed; petiole 2—2.5 cm. long. *Flowers*: ♂ in drooping, solitary, axillary, 10- to 16-flowered rusty-tomentose umbellate cymes; peduncle 5—6 mm. long; pedicels thick, 3 mm. long; bracteole half-orbicular, up to 5 mm. long, embracing the lower half of the flower on one side; perianth ovate, rusty-tomentose without, granular within, up to 6.5 mm. long, teeth ovate, acute; andræcium fusiform, shortly apiculate, 5 mm. long, on a very short rufous-villous column: anthers 7 or 8, linear: ♀ not known. *Fruit* oblong, 7—9 cm. long and 3—4 cm. in diam., blunt, glabrous; peduncle about 2.5 cm. long, stout, woody; pericarp thick, fleshy. *Seed* ellipsoid, smooth, 5 cm. long; arillus fleshy, reaching to the apex of the seed, deeply fimbriate in its upper half. King Ann. Calc. III. 294, t. 114; Warb. Monog. Myrist. 398.

PENANG: at Moniot's road, 450. m. alt., *Curtis* 2455!. PERAK: *Scortechini*!. MALACCA: *Maingay* K. D. 1289!; at Bukit Jús, *Derry* 1033!.

3. MYRISTICA GIGANTEA, King in Ann. R. Bot. Gard. Calc. III. 288, t. 110 (1891). A large tree reaching 27—40 m. in height and considerable girth; bark black, fissured; branchlets thin, at first rusty-puberulous, afterwards glabrous and dark coloured; leaf-buds lanceolate, rusty-puberulous. *Leaves* coriaceous; narrowly elliptic-oblong or -lanceolate, obtuse or obtusely acute at apex, acute at base; both surfaces glabrous, upper shining, pale when dry, lower dull, pale, subglaucous at first; margins revolute; 7—11 cm. long, 2—3.5 cm. broad; midrib impressed and keeled above, prominent beneath; main nerves 12—18 pairs, subhorizontal, faint, impressed above, interarching close to the edge; reticulation impressed above, obscure beneath; petiole 12—18 mm. long, channelled. *Flowers*: ♂ in rusty-pubescent, cymose, rather stout panicles from the axils of the leaves or of fallen leaves, twice as long as the petioles; perianth 3—4 mm. long, ovoid, with short blunt or subacute teeth, rusty-tomentose without, subglabrous within; pedicel 3—4 mm. long; bracteole narrowly semi-annular, embracing half the base of the perianth, tomentose; andræcium half the length of the perianth, cylindric, blunt, the anthers linear, about 10, stalk about one-third of the length of the column, tomentose: ♀ unknown. *Fruit* (immature) 2.5 cm. long, solitary, on a thick woody pedicel 12—25 mm. long, broadly ovoid, slightly pointed, densely rufous-tomentose. *Seed* ovoid, shining; the arillus thin, extending to the apex of the



seed, narrowly fimbriate nearly to the base. Warb. Monog. Myrist. 400.

PERAK: at elevations under 300 m. alt., *Scortechini* 1949!; *King's Collector* 5866!, 6050!.

4. *MYRISTICA INERS*, Bl. Bijdr. 575 (1828). A tree; branchlets slender, dark brown, rough, uppermost subglaucous and slightly puberulous. *Leaves* chartaceous; oblong-lanceolate or oblanceolate, acute or slightly acuminate at apex, attenuate at base; both surfaces glabrous, upper olivaceous when dry, lower reddish-brown; margins slightly recurved; 8—18 cm. long, 3—4 cm. broad; midrib slender, keeled above; main nerves 12—15 pairs, impressed above, oblique, curving to and along the margin but not looped; transverse nervules and reticulation obscure; petiole 1 to 1.5 cm. long, often twisted. *Flowers*: ♂ in short panicles of subumbellate cymes from the axils of the leaves or of fallen leaves, the panicles up to 2—2.5 cm. long; pedicels slender, about 4 mm. long; bracteole ovate, 1.25 mm. long, embracing the base of the perianth; perianth ovoid, 3—4 mm. long, rusty-puberulous without, glabrous within, 3-toothed, the teeth 1—1.5 mm. long; andræcium 2.5 mm. long, slender, the anthers as long as the stalk, the latter rather slender, puberulous; anthers about 10: ♀ in short axillary panicles about 14 mm. long, puberulous; bracts very short as are the pedicels, bracteoles large, at the base of the perianth; perianth inflated, campanulate, tomentose without, 5 mm. long, 4 mm. broad; ovary ovoid-conic, ferruginous-pubescent; stigma obtuse. *Fruit* very large, oblong, single or in pairs, up to 7 cm. long, 4 cm. thick; peduncles short, thick; pericarp slightly tomentose, soon glabrescent. *Seed* 4—5 cm. long, 2—3 cm. broad; the arillus thick, red, lacinate except near the base. Bl. Rumphia I. 184, t. 58; A. DC. Prodr. xiv. 190 (*excl. syn.* Roxb. and Cum.); Miq. Fl. Ind. Bat. I. 2. 57 (*excl. as above*); Koord. & Val. Bijdr. iv. 175; Warb. Monog. Myrist. 521, t. xvii. *M. sublanco-lata*, Miq. l.c. 58.

PERAK: at lower camp, Gunong Batu Pateh, at about 1000 m. alt., *Wray* 1214!.

5. *MYRISTICA MALACCENSIS*, Hook. f. Fl. Br. Ind. v. 104 (1886). A glabrous tree; branchlets rather slender. *Leaves* oblong or oblong-elliptic, acute or acuminate at apex, usually rounded but sometimes acute at base; 15—25 cm. long, 4—9 cm. broad; midrib stout; main nerves 15—20 pairs, at first nearly straight, finally

interarching near the edge; petiole 1—2 cm. long. *Flowers*: ♂ in solitary panicles from the axils of the leaves or of fallen leaves, 7—10 cm. long, slender; flowers 2·5 mm. long on filiform pedicels 5 mm. long in subumbellate cymes; bracteoles large, reniform, membranous, glabrous with ciliate margins; perianth subglobose, sub-inflated, very coriaceous, glabrous, its apex with 3 broad blunt shallow teeth; androecium much shorter than the perianth, broad, subtruncate, almost sessile; anthers about 7, their tips free, sub-acute: ♀ not known. *Fruit* unknown. King Ann. Calc. III. 287, t. 107 bis; Warb. Monog. Myrist. 411.

MALACCA: *Maingay* K.D. 1305.

6. *MYRISTICA ELLIPTICA*, Wall. Cat. 6798A (1828). A tree reaching 18—24 m. in height and 60—90 cm. in diam. of stem; branches stout, spreading; branchlets rather slender, pale, at first rusty puberulous, afterwards glabrous like all other parts. *Leaves* chartaceous; elliptic or elliptic-oblong to linear-oblong, shortly and rather bluntly acute or acuminate at apex, cuneate and slightly unequal at base; both surfaces pale when dry, upper shining, lower dull, glaucous; margins slightly recurved when dry; 13—20 cm. long, 4—10 cm. broad; midrib stout, prominent beneath; main nerves 8—12 pairs, distant, curving to and along the margin, slender; reticulation not visible; petiole 12—20 mm. long. *Flowers*: ♂ in shortly pedunculate, supra-axillary umbels rather longer than the petioles; peduncles 5—7 mm. long; pedicels 2·5—5 mm. long; bracteole suborbicular; perianth 8—9 mm. long, elongate and narrowly tubular, suburceolate, divided for  $\frac{1}{3}$  to  $\frac{1}{2}$  its length into 3 narrowly ovate acute teeth with many black glandular dots, puberulous or glabrous without, glabrous within; androecium cylindric, bluntly apiculate, nearly as long as the tube, the stalk shorter than the column; anthers about 10: ♀ umbellate like the ♂: perianth distinctly urceolate, the lobes ovate, blunt; ovary sessile, adpressed pubescent, tapering into the oblique lateral stigma; style 0. *Fruit* oblong, long-narrowed at the base, ridged along the suture, slightly gibbous; 7—8 cm. long, 2—3·5 cm. broad, glabrous; pericarp reddish-yellow, thick, succulent. *Seed* cylindric, tapering at the ends; arillus deep red, lacinate at the sides, rather succulent. Hook. f. & Th. Fl. Ind. 162; A. DC. Prodr. xiv. I. 190; Miq. Fl. Ind. Bat. I. 2. 58; Hook. f. Fl. Br. Ind. V. 102; King Ann. Calc. III. 295, t. 113; Warb. Monog. Myrist. 435, t. xvi. *M. calocarpa*, Miq. l.c. 68, Suppl. 383 and Ann. Mus. Lugd.-Bat. II. 48. *M. sycocarpa*, Miq. l.c. 68 and Ann. l.c. 48.

PENANG AND SINGAPORE: *Wallich* and *Porter* 6798A!. PENANG: *Curtis* 1122!. PERAK: in dense forest on low hills, *King's Collector* 3732!, 4276!, 4426!, 4703!, 5198!, 5288!, 8559!, 10321!, 10583!; at Waterfall hill and Tupai, *Wray* 1736!, 2345!; at Goping, *Scortechini* 79!, 1964!. MALACCA: *Maingay* K.D. 1296!. SINGAPORE: by stream, Chanchukang, *Ridley* 331!; at Bukit Timah, *Ridley* 6920!.—DISTRIB. Sumatra, Borneo.

7. *MYRISTICA SUAVIS*, King in Ann. R. Bot. Gard. Calc. III. 295, t. 121 (1891). A tree, all parts glabrous except the minutely pubescent leaf-buds and flowers; branchlets rather stout, cinereous, striate, the tips dark-coloured and smooth. *Leaves* coriaceous; elliptic-lanceolate, acute at each end, the base slightly unequal-sided; upper surface dull, lower pale; margins recurved; 15–23 cm. long, 5–6 cm. broad; midrib stout; main nerves 20–25 pairs, at first straight, parallel, then curving to and along the margin, impressed on the upper, prominent on the lower surface; petiole 2.5 mm. long, stout, channelled above. *Flowers*: ♂ 2–4 together in short thick woody racemes from the axils of the leaves; or close together on the branches below the leaves; pedicels about 2.5 mm. long; bracteole broad, semi-orbicular, embracing the base of the flower on one side; perianth narrowly campanulate, cut half-way down into 3 triangular acute recurved teeth, scurfy-tomentose without, glabrous within; androecium cylindric, not apiculate, shortly stalked; anthers about 6, linear, connate: ♀ like the ♂ but with longer stouter pedicels and shorter teeth; ovary narrowly ovoid, minutely tomentose; stigma sessile, divided by a central groove into 2 oblong lobes. *Fruit* unknown, the arillus of the young seed extending to its apex, deeply and narrowly lacinate, Warb. Monog. Myrist. 441.

MALACCA: at Selandor: *J. M. Alwis*!.

8. *MYRISTICA CINNAMOMEA*, King in Ann. R. Bot. Gard. Calc. III. 292, t. 116 (1891). A tree reaching 18 to 24 m. in height and 60 to 120 cm. in diam. of stem; branches spreading; branchlets thin, rather dark, sparingly rufous-puberulous at first, finally glabrous; buds lanceolate. *Leaves* thinly coriaceous; lanceolate or oblong-lanceolate, tapering about equally to either end; upper surface shining, pale brownish-green when dry, lower uniformly covered with a close layer of cinnamomeous minute stellate adpressed hairs; margins recurved when dry; 10–25 cm. long, 3–7 cm. broad; midrib stout, deeply impressed above; main nerves 14–20 pairs, faint on both surfaces, slightly impressed on the upper, ascending;

reticulation not visible; petiole 1—2 cm. long, scurfy-pubescent. *Flowers*: ♂ in rufous-tomentose 8- to 14-flowered axillary umbellate cymes about as long as the petioles; peduncle stout, flattened, 10—12 mm. long; pedicels slender, 5 mm. long; bracteole ovate, acute, obliquely embracing one side of the base of the flower; perianth elongate-ovoid, tubular, 6 mm. long, minutely scurfy-tomentose without, glabrous within, teeth subacute; andrœcium cylindric, nearly as long as the perianth, slightly apiculate, on a stalk nearly or quite as long; anthers about 10, linear: ♀ not known. *Fruit* reddish-yellow, ellipsoid, sometimes tapering at the base, the apex sub-obtuse but apiculate, 6—9 cm. long, ridged down the middle, minutely rufous-tomentose; pericarp 9—12 mm. thick, fleshy; peduncle stout, 6—12 mm. long and about 5—7 mm. thick. *Seed* cylindric-ellipsoid, 5 cm. long; testa thin, shining; arillus thin, extending to the apex of the seed, deeply lacinate at the sides. Warb. Monog. Myrist. 445.

PERAK: at elevations under 450 m. alt., *King's Collector* 1057!, 3554!, 5170!, 5355!, 5458!, 5770, 6696!, 7474!; *Wray* 3026!. SINGAPORE: at Changi, Bukit Mandai and Sumbanang, *Ridley* 3377!, 3581!, 5572!, 6266!.

9. MYRISTICA FRAGRANS, Houtt. Handleid Hist. Nat. Linn. II. 3. 233 (1774). A tree reaching 12—15 m. in height and a considerable girth, glabrous except the ovary and young fruit; bark nearly black; branchlets slender, brownish; leaf-buds linear-lanceolate. *Leaves* thinly coriaceous; elliptic-oblong or lanceolate, shortly acuminate at apex, acute at base; upper surface shining, lower dull subglaucous; 6—13 cm. long, 4—6.5 cm. broad; midrib moderately stout, prominent beneath; main nerves 8—10 pairs, impressed above, prominent beneath, curving to and along the margin; reticulation obscure; petiole 10—15 mm. long, slender. *Flowers*: ♂ in slender supra-axillary umbellate cymes 2—3 cm. long; perianth 5 mm. long, ellipsoid, sub-urceolate with short triangular teeth; bracteole ovate, 1.5 mm. long, deciduous leaving an oblique ring; pedicels slender, 6—12 mm. long; andrœcium cylindric, 3 mm. long, on a stalk 1.5 mm. long; stamens 9—12: ♀ larger than the ♂ and in fewer-flowered umbels; perianth 8—10 mm. long, urceolate, the teeth short, reflexed; ovary sessile, cylindric-ellipsoid, tawny-villous; stigmas 2 flat, broad, fleshy. *Fruit* broadly pyriform, sometimes apiculate, 6—9 cm. long and nearly as broad, glabrous; pericarp yellow, succulent. *Seed* broadly ovoid, areolate, striate, embraced to

the apex by the red, fleshy, much lacinate arillus. A. DC. Prodr. xiv. 1. 189; Bl. Rumph. I. 180, t. 55; Miq. Fl. Ind. Bat. I. 2. 53; Benth. & Trim. Med. Pl. III. t. 218; Baill. Hist. des Pl. II. 498, tt. 298—306; Engl. & Prantl Naturl. Pflanzenfam. III. 2. 41, fig. 35; Hook. f. Fl. Br. Ind. V. 102; King in Ann. Calc. III. 287, t. 108; Koord. & Val. Bijdr. IV. 194; Brandis Ind. Trees, 524. *M. officinalis*, Linn. f. Suppl. 265; Gaertn. Fruct. I. 194, t. 41 (*excl. syn. Rumph.*); Hook. Exot. Bot. t. 155, 156 and Bot. Mag. tt. 2756, 2757; Spach Suites Buff. t. 143; Warb. Monog. Myrist. 458. *M. moschata*, Thunb. in Act. Holm. (1782) 45; Wall. Cat. 6785; Roxb. Fl. Ind. III. 733; Bl. Bijdr. 575. *M. aromatica*, Lamk. in Act. Par. 155 (1788) tt. 5—7 and Ill. Gen. t. 832; Roxb. Cor. Pl. III. 274, t. 267—‘Pala’ Rumph. Herb. Amb. II. 14, t. IV. The Nutmeg Tree.

Cultivated in the Malay Peninsula. PENANG: Wallich 6785 E; King's Collector 1677!; Curtis!. MALACCA: Griffith K. D. 4352!; Maingay K. D. 1285!. SINGAPORE: Cuming 2418!.—DISTRIB. Indigenous in the Moluccas, cultivated in most tropical regions.

I have thought it right to include the description of the true Nutmeg tree, so universally cultivated in tropical countries.

10. MYRISTICA CRASSA, King in Ann. R. Bot. Gard. Calc. III. 293, t. 117 (1891). A large tree reaching 12 to 18 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets rather stout, very dark-coloured, glabrous. Leaves coriaceous; oblong, elliptic-oblong or oblanceolate, acute, rarely acuminate at apex, cuneate at base; both surfaces glabrous, the lower pale, subglaucous; margins recurved when dry; 18—40 cm. long, 7—12 cm. broad; midrib prominent, especially beneath; main nerves 15—22 pairs, impressed above, spreading and interarching near the edge; reticulation obscure; petiole 2.5—3.5 cm. long, stout, channelled. Flowers: ♂ in many-flowered tomentose sessile umbels from stout woody axillary peduncles about 5 mm. long; pedicels 5—7 mm. long, rather slender; bracteole orbicular-ovate, rugose, closely embracing half the flower on one side; perianth 5 mm. long, minutely rusty-tomentose without, glabrous within, ovoid when young, urceolate and slightly constricted about the middle when adult, the apex acute, 3-cleft to about one-third of its length, the teeth ovate-acute; andræcium narrowly ovoid, apiculate, 3 mm. long, on a lepidote stalk of 2 mm; anthers 14—18, linear: ♀ not known. Fruit solitary or in clusters of 2—3, pedunculate, ovoid-globose, slightly pointed, the base rounded or subtruncate, minutely rufous-puberulous, 3.5—7.5 cm.

long and half as much in diam.; pericarp yellowish, thick, succulent. Seed ovoid; arillus fleshy, yellow, laciniate, extending to the apex of the seed. Warb. Monog. Myrist. 495.

PERAK: at low elevations under 150 m. near Larut, etc., *King's Collector* 2758!, 4475!, 5065!, 6061!, 7756!, 10038!; Waterfall Hill, *Wray*, 646!. MALACCA: *Cantley* 35!.

11. MYRISTICA LOWIANA, King in Ann. R. Bot. Gard. Calc. III. 293, t. 120 (1891). A tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets rather stout, rough, dark-coloured. Leaves coriaceous; oblong, elliptic-oblong or sometimes slightly obovate, acute sometimes acuminate at apex, cuneate or rounded and sometimes unequal at base; upper surface shining, lower dull, subglaucous, both surfaces glabrous; margins recurved; 15—30 cm. long, 5—9 cm. broad; midrib very stout, somewhat impressed above, prominent beneath; main-nerves 16—20 pairs, prominent on both surfaces and impressed on the upper, parallel, at first straight, curved near the margin and interarching; transverse nervules visible and impressed on the upper surface; petiole 2—3 cm. long, stout. Flowers: ♂ in dense many-flowered rusty-pubescent glomeruli, shorter than the petioles, from small solitary thick tubercles 5 mm. long in the axils of the leaves or of fallen leaves; pedicels slender, 3.5—7.5 mm. long; bracteole ovate or obovate-rotund, embracing more than half the perianth on one side, glabrous within, 2—5 mm. long; perianth 2.5—3.5 mm. long, ovoid, rusty-pubescent without, glabrous within, cut to about one-third of the way down into 3 broadly triangular teeth; andrœcium ellipsoid, on a puberulous stalk much shorter than itself, together 2 mm. long; anthers about 10—14: ♀ not known. Fruit ovoid, pointed at each end, 6—8 cm. long, 3—4 cm. in diam. covered with soft rufous woolly tomentum; pericarp sinuate-ridged, the ridges appearing through the tomentum. Seed ellipsoid, blunt at both ends, about 5 cm. long; arillus thin, extending to the apex of the seed, its sides cut into wide areolæ. Warb. Monog. Myrist. 496.

PERAK: at Port Weld, *Scortechini* 1551!, 1855!; in rocky localities in forest up to 300 m. alt. near Larut, *King's Collector* 5537!, 7258!. MALACCA: at Merliman, *Goodenough* 1621!.

*Ridley* No. 10922 from Fort Canning, Singapore, is *Myristica quatterifolia*, A. DC.; Warb. Monog. Myrist. 412. In all probability it is from a cultivated plant. The tree is common in the Philippine Islands and has also been collected at Labuan in Borneo (*Motley* 139!)



## 4. KNEMA, Lour.

Dioecious trees with coriaceous or chartaceous leaves usually glaucous beneath, often covered with ferruginous tomentum; main nerves confluent near the margin; transverse nervules parallel, prominent. *Inflorescence* of unbranched densely racemose or subumbellate clusters usually on thick tubercular peduncles from the axils of the leaves or of fallen leaves; bracts caducous; flowers rather large, subglobose patelliform or urceolate, pedicellate; bracteoles persistent about the middle of the pedicels or above it; perianth 3-toothed. *Andræcium* usually stalked; filaments connate in a peltate disk; anthers 8—20 free, attached by thin bases stellately to the margin of the disk, never erect, dehiscing downwards. *Style* short, thick; stigmas connate in a bilobed disk often dentate or laciniate at the margin. *Fruit* ovoid or oblong; pericarp thick, fleshy, tomentose; arillus laciniate at the apex only. *Seed* conform to the fruit; albumen ruminant; cotyledons scarcely connate at the base, divaricate or suberect.—*DISTRIB.* S. Asia from India to the Philippines and New Guinea, species about 38.

♂ flowers very large, about 1 cm. in diam.; leaves very long, 25—65 cm.; fruit large, with very thick wool; disk of andræcium subconcave with 18—20 anthers 1. K. HOOKERIAN.

♂ flowers moderate-sized, 5—8 mm. in diam.; leaves 18—40 cm. long; fruit medium-sized, rufous-tomentose; disk of andræcium convex with 13—15 anthers 2. K. CANTLEYI.

♂ flowers small, under 5 mm. in diam.  
Disk of andræcium convex-mammillate at top;  
leaves narrow with parallel nerves 10—32 cm.  
long, 2—9 cm. broad .. .. 3. K. INTERMEDIA.

Disk of andræcium not mammillate.

Pedice of ♂ flower more than double as long as the perianth.

Anthers 40—45, sessile, disc concave; leaves small, 6—14 cm. long, 3—6 cm. broad, nervules and reticulation scarcely visible .. 4. K. CURTISII.

Anthers less than 20, mostly 8—13; disc flat, anthers horizontal on short filaments on its margin.

Pedice of ♂ flower  $4\frac{1}{2}$ —6 times longer than perianth; anthers 9—12.

Leaves thinly coriaceous with 7—14 pairs of main nerves; reticulation prominent 5. K. KUNSTLERI

Leaves membranous with 13—18 pairs of main nerves; reticulation obscure .. 6. K. MALAYANA

- Pedice! of ♂ flower 2—4 times longer than perianth; anthers 8—18.
- Young branchlets nearly glabrous; nerves weak; fruit large, 2.5—4.5 cm. long .. .. 7. *K. WRAYI*.
- Young branchlets rusty-pubescent; nerves strong; fruit 3—4 cm. long .. 8. *K. CONFERTA*.
- Pedice! of ♂ flower twice longer than the perianth or less than it.
- Mature leaves glabrous beneath, at most the nerves a little hairy; pedice! almost always twice as long as the ♂ perianth; anthers suberect or erect on the margin of the usually flat or slightly concave disc.
- Bark of the branchlets longitudinally cracked, black; leaves reddish-glaucous beneath, cordate at base; anthers 10—12 .. .. 9. *K. PURPUREA*.
- Bark of the branchlets not longitudinally cleft.
- Anther-bearing disk very small, its stalk long; anthers 6—10, suberect, leaves large, glaucous beneath, cordate .. 10. *K. OBLONGIFOLIA*.
- Anther-bearing disk of ordinary diameter, its stalk short.
- Leaves oblong-lanceolate 10—15 cm. long, 2—5 cm. broad; flowers about 8 in umbel .. .. 11. *K. MISSIONIS*.
- Leaves lanceolate 8—14 cm. long, 2.5—4.5 cm. broad; flowers 3—4 in umbel 12. *K. GEMINATA*.
- Mature leaves pubescent beneath and on the nerves; pedice! shorter than the ♂ perianth; stamens 6—9 erect on the margin of a small disk, stalk long .. .. 13. *K. LAURINA*.
- Species of which the ♂ flower are unknown; mature leaves very large, appressed pubescent beneath; fruit over 5 cm. long .. .. 14. *K. RETUSA*.

1. *KNEMA HOOKERIANA*, Warb. Monog. Myrist. 251, t. xxiv. (1897). A large tree reaching a height of 18—30 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets stout, with dark grey bark peeling off in flakes, innovations densely covered with soft tawny flocculent wool. *Leaves* coriaceous; oblong-lanceolate or oblanceolate, obtuse or acute at apex, acute or somewhat rounded or even subcordate at base; both surfaces glabrous when adult, when young softly flocculent beneath, the upper shining, the lower subglaucous; 25—65 cm. long, 5—17 cm. broad; midrib stout, broad at base;

main nerves 20—30 pairs, prominent especially beneath, parallel, curving to close to the margin and then interarching; transverse nervules many, sub-parallel, prominent beneath; petiole very stout, 1—1.5 cm. long, at first thickly rusty-flocculent afterwards glabrous. *Flowers*: ♂ in clusters of from 6 to 9 from thick tubercles in the axils of fallen leaves nearly 1 cm. in diam., densely flocculent-woolly; pedicels 1—2 cm. long; bracteole broadly ovate, 2—3 mm. below the flowers, 5 mm. long; perianth obovoid, the teeth 3 broadly triangular, thick and fleshy, glabrous inside and longitudinally furrowed toward the base; andrœcium on an obconic furrowed stalk, disk subconcave glabrous bearing on the margin 18—20 sessile curved anthers: ♀ with shorter pedicels and broader teeth; ovary densely woolly, stigma subsessile, concave, with many irregular lobes. *Fruit* ellipsoid, 4.5—8 cm. long, 3—4 cm. thick, densely covered with a coating of dense silky fulvous wool, thicker than the crustaceous pericarp. *Seed* cylindric-ovoid; arillus thin, reniform, scarlet, completely enveloping the testa. *Myristica Hookeriana*, Wall. Cat. 6802 A; Hook. f. & Th. Fl. Ind. V. 156; A. DC. Prodr. xiv. 204; Miq. Fl. Ind. Bat. I. 2. 69, Suppl. 384; Hook. f. Fl. Br. Ind. V. 109; King Ann. Calc. III. 325, t. 163.

PENANG: *Wallich* 6802 A!; Government Hill, *Maingay* K.D. 1279!; *Curtis* 202!, 2479!; *Norris*!. PERAK: in hill forest near Goping and Larut at 120—240 m. alt., *King's Collector* 5754!, 6007!, 6656!. MALACCA: *Griffith* K.D. 4342!. SINGAPORE: *Cantley* 2904!; *T. Anderson* 10!; *Hullett* 314!; at Bukit Timah, etc., *Ridley* 2109!, 3701!.—DISTRIB. Borneo; Sumatra (at Ogan-Ulu, Palembang, *Teysmann*!).

2. *KNEMA CANTLEYI*, Warb. Monog. Myrist. 554, t. xxiv. (1897). A tree reaching 6—15 m. in height and 20—30 cm. in diam. of stem; branchlets moderately stout, pale reddish-brown with smooth bark, the young ones and innovations densely felted with rufous tomentum, the hairs branched. *Leaves* coriaceous; oblong or oblong-lanceolate, acute at apex, subacute or rounded at base; upper surface shining, glabrous, lower glaucescent, glabrous when old, when young flocculently rufous-tomentose; margins slightly recurved; 18—40 cm. long, 4—9 cm. broad; midrib prominent, raised on both surfaces; main nerves 15—20 pairs, raised above, curved to near the margin and then interarching, the lower in diminishing loops, the upper in single loops; transverse nervules subparallel, branching

into the netted reticulation; petiole stout, 1—3 cm. long, at first thickly rufous-tomentose, afterwards glabrous. *Flowers*: ♂ densely felted, rufous tomentose, in many-flowered sessile umbels from tubercles in the axils of leaves and of fallen leaves; pedicels 1—1.5 cm. long; bracteoles ovate, close to the perianth; perianth depressed, trigonous, obovoid-globose, 6 mm. in diam., lobes 3, broadly triangular, glabrous within; andrœcium surrounded by a raised disk, the stalk cylindric 1 mm. high, the peltate top convex, papillose, surrounded by the radiating anthers, anthers 13—15 with short filaments: ♀ subsessile in few-flowered clusters on tubercles as in ♂; buds ovoid, the bracteole minute, lobes 3 broadly triangular, glabrous within; ovary depressed globular, densely rufous-tomentose; stigma peltate, large, with 12 or more often-forked lobes. *Fruit* ellipsoid, blunt, densely covered with rufous-tomentum, about 3 cm. long, 2 cm. broad, supported by the persistent perianth-lobes. *Seed* narrowly obovate, pointed; arillus thin, entirely enclosing the testa. *Myristica Cantleyi*, Hook. f. Fl. Br. Ind. V. 110; King Ann. Calc. III. 327, t. 168.

PENANG: at Pulau Boetong, *Curtis* 2770!. PERAK: at Thaipeng, etc., *Wray* 2700!, 3126!; *Scortechini*!; in dense forest on low wet ground near Thaipeng and Larut, *King's Collector* 3350!, 5317!, 5614!, 6569!, 6867!, 7290!, 8443!. SINGAPORE: *Cantley* 195!, 3083!.

3. *KNEMA INTERMEDIA*, Warb. Monog. Myrist. 564, t. xxv. (1897). A tree reaching 12—24 m. in height and 30—45 cm. in diam. of stem; branchlets moderately stout with greyish rather smooth bark, younger thinly covered with minute scurfy rufous tomentum. *Leaves* coriaceous; narrowly oblong-lanceolate or oblong, acute or shortly acuminate at apex, shortly cuneate or rounded at base; upper surface shining, lower pale, both when young rusty-pubescent, afterwards glabrous; 10—40 cm. long, 2—9 cm. broad; midrib prominent, raised on both surfaces; main nerves 12—22 pairs, raised above, parallel, slightly curving to the margin and flatly interarching close to it; transverse nervules very many, raised and prominent on the upper surface and branching into the netted reticulation; petiole 10—13 mm. long, at first tomentose, afterwards glabrous and black, channelled. *Flowers*: ♂ in rusty-tomentose umbels of 6—8 from short rounded woody tubercles in the axils of leaves or of fallen leaves; pedicels rather slender, up to 1 cm. long; bracteole small, ovate, close under the perianth; perianth ovoid-

globose, subtrigonal, 4—7 mm. in diam., lobes triangular-ovate, glabrous and striate within; andrœcium convex-mammillate at top, the stalk very short, the disk radiating; anthers 12—15: ♀ in axillary umbels similar to ♂ but sessile, the bracteole embracing the perianth; perianth obovoid, lobes 3, acute; ovary ovoid, densely rufous-tomentose; stigma sessile with 6—8 short suberect narrow lobes. *Fruit* usually solitary, rarely in clusters of 2—3, 3·5—4 cm. long, 2 cm. in diam., ellipsoid, grooved on one side, covered with a thin layer of minute rufous tomentum. *Seed* ellipsoid, elongate, subrugose; arillus thin, entire or shortly laciniate towards the apex, completely enveloping the testa. *Myristica intermedia*, Bl. Rumph. I. 187; Hook. f. & Th. Fl. Ind. 158; A. DC. Prodr. xiv. 1. 206; Miq. Fl. Ind. Bat. I. 2. 70; Ann. I. 207; Hook. f. Fl. Br. Ind. V. 112; King Ann. Calc. III. 318, t. 154; Koord. & Val. Bijdr. IV. 192. *M. iteophylla*, Miq. l.c. 59. *M. corticosa*, Hook. f. & Th. var. *decipiens*, Miq. Ann. II. 57.

PENANG: Government Hill, etc., *Curtis* 1044!, 3402!; Waterfall Gardens, *Ridley* 10786!. PERAK: at Batu Togoh, etc., *Wray* 2130!; 3010!; at Haram Parah, *Scortechini* 631!, 803!; in dense forest on low ground up to 120 m. alt., *King's Collector* 5419!, 6146!, 6371!, 6704!, 7576!. MALACCA: *Griffith* K.D. 4359! (with diseased ♂ flower); *Maingay* K.D. 1281!; *Cantley* 525!. SINGAPORE: at Bukit Timah, *Cantley* 29!, 83!; *Lobb*!; at Tanglin, *Hullett* 5739!; *Ridley* 1820!, 7203!, 2039!, 2107!, 9222!.—DISTRIB. Java (*Koorders*!, *Forbes* 542!, etc.), Sumatra (*Forbes* 2573!), Borneo (*Korthals*), etc.

Var. *dubia*, Warb. *Leaves* broader, the transverse nervules very slender; branchlets, petioles and flowers densely furfuraceous.

PENANG: *Wallich* 6810!.

4. KNEMA CURTISII, Warb. Monog. Myrist. 567, t. xxv. (1897). A tree, all parts glabrous except the minutely puberulous leaf-buds and ♂ flowers; branchlets slender with greyish bark, uppermost light brown sometimes becoming nearly black. *Leaves* thinly coriaceous; elliptic, elliptic-ovate or -obovate, acute or subacuminate at apex, acute at base; upper surface shining, olivaceous when dry, lower dull, subglaucous; margin slightly recurved; 6—14 cm. long, 3—6 cm. broad; midrib slender; main nerves 9—16 pairs, slightly curved to interarch near the margin; secondary nerves few, transverse nervules irregularly subparallel, enclosing the prominent minutely netted reticulation; petiole about 1 cm. long, slender.

*Flowers*: ♂ in umbels of 3—10 from short woody axillary tubercles; pedicels slender, 6—10 mm. long; bracteole minute, near the base of the pedicels; perianth depressed-ovoid, trigonous, 3 mm. in diam., lobes 3 broadly triangular; androecium with a concave disk, sometimes slightly convex in the middle, the stalk short, thick, obconic; anthers about 40—45, sessile on the margin of the disk: ♀ in few-flowered umbels; pedicels scarcely shorter than in ♂; ovary ovoid, tomentose, the stigma with 6 radiating acute teeth. *Fruit* solitary or in pairs, ellipsoid or ovoid, often gibbous at the base, sometimes with two keels one more prominent than the other, 2.5—3 cm. long, about 2 cm. in diam., pericarp pale greenish orange, rusty-puberulous. *Seed* ovoid; arillus red, thin, entire or slightly lobulate at apex, completely enclosing the testa. *Myristica Curtisii*, King Ann. Calc. III. 326, t. 167. *Myristica* (Maingay 1301) Hook. f. Fl. Br. Ind. V. 113.

PENANG: Waterfall, etc., *Curtis* 1024!, 1301!, 3679!. PERAK: at Hermitage, *Curtis* 1320!; at Thaipeng, *Wray* 2112!; at Haram Parah, etc., *Scortechini* 292!, 763!. MALACCA: *Maingay* K.D. 1301!; *Alwis* 2240!; at Batu Tiga, *Derry* 1172!. NEGRI SEMBILAN: at Tampin Hill, *Goodenough* 1854!.

5. KNEMA KUNSTLERI, Warb. Monog. Myrist. 568, t. xxv. (1897). A tree reaching 9 to 15 m. and even to 30 m. in height with a stem of considerable diameter; branches spreading; branchlets slender, at first slightly and minutely rusty-tomentose as are the innovations, afterwards dark and glabrous. *Leaves* thinly coriaceous, glabrous, much reticulate when dry; elliptic or elliptic-oblong, sometimes ovate, shortly and often bluntly acute or acuminate at apex, sometimes obtuse, cuneate and rounded and slightly unequal at base; upper surface shining, greenish when dry, lower glaucescent, brownish white with small brown dots; 8—18 cm. long, 4—8 cm. broad; midrib rather slender, keeled above; main nerves 7—14 pairs, brown, scurfy and prominent on the lower surface, parallel, slightly curved and interarching near the margin; transverse nervules subparallel, hardly more prominent than the conspicuously netted reticulation; petiole stout, dark, 12—14 mm. long. *Flowers*: ♂ in 4—12-flowered rusty-pubescent umbels from short woody axillary tubercles; pedicels 7—10 mm. long, slender, the minute bracteole at or a little above the middle; perianth in bud depressed-globose, trigonous, 2—4 mm. in diam., when open spreading, lobes 3, fleshy, broadly triangular-ovate, concave, glabrous within; androecium with



short cylindric stalk, disc flat glabrous; anthers 9—12 horizontal, with short filaments attached to the edge of the disc: ♀ not known, ovary sessile, ovoid, rugulose; style very short glabrous; stigma with 3 short spreading conical lobes. *Fruit* usually solitary, yellow, sometimes in clusters of 2—3, pedunculate, 20—22 mm. long, 15—17 mm. in diam., broadly ovoid-globose, slightly apiculate, ferruginous-puberulous when young, afterwards glabrescent. *Seed* broadly ovoid, smooth; arillus red, thin, slightly lobed at the apex, completely enveloping the testa. *Myristica Kunstleri*, King Ann. Calc. III. 314, t. 149.

PERAK: Maxwell's Hill at 900 m. alt., *Curtis* 2051!; *Scortechini* 175!; at Gunong Keledang, *Ridley* 9587!; at Waterfall Hill and Blanda Mabok, *Wray* 2056!, 3985!; in hilly forests at various elevations up to 600 m. alt., *King's Collector (Kunstler)* 2614!, 2743!, 3372!, 3393!, 3510!, 4150!, 4216!, 4414!, 4605!, 4949!, 5867!, 6440!, 7180!, 10022!, 10549!, 10826!. SELANGOR: at Kwala Lumpur, *Ridley* 3538!.

6. KNEMA MALAYANA, Warb. Monog. Myrist. 570, t. xxv. (1897). A tree reaching 9—21 m. in height and 25—30 cm. in diam. of stem; branches spreading or drooping; branchlets rather slender, minutely rufous-pubescent when young, finally glabrous, dark and striate. *Leaves* membranous; narrowly elliptic or oblong-lanceolate, sub-acute or obtusé at apex, rounded or subcuneate at base; upper surface glabrous, shining, lower glaucescent; 9—15 cm. long, 3.5—6 cm. broad; midrib slender, keeled above; main nerves 13—18 pairs, spreading, prominent beneath, parallel, interarching near the margin; transverse nervules subparallel, prominent, enclosing the netted reticulation; petiole nearly 1 cm. long, slender. *Flowers*: ♂ in almost sessile axillary 5- to 8 flowered rusty-puberulous umbels from axillary or lateral tubercles; pedicels slender, 12—15 mm. long, bearing the minute bracteole above the middle; perianth in bud depressed-globose, bluntly 3-angled, 3 mm. in diam., lobes 3, broadly ovate, fleshy, striate and glabrous within; andrœcium on a short stalk thickened upwards, the disc flattened bearing 10—12 anthers radially on the margin: ♀ in fewer-flowered umbels than ♂, obovoid in bud; ovary sessile ovoid-globose, style short; stigma peltate, glabrous, with 4 acute lobes. *Fruit* small, ovoid or slightly obovoid, narrowed at the base, 12—14 mm. long, 9—11 mm. in diam., minutely rusty-tomentose. *Seed* ovoid-rotund, sessile, smooth; arillus thin, reniform, irregularly fimbriate at apex, enveloping the

testa. *Myristica glaucescens*, Hook. f. & Th. Fl. Ind. 157 non *Knema glaucescens*, Jack; Hook. f. Fl. Br. Ind. V. III in part; King Ann. Calc. III. 323, t. 161. *M. corticosa*, A. DC. Prodr. xiv. 1. 205 (in part); Miq. Fl. Ind. Bat. I. 2. 69 (in part).

PENANG: *Curtis*. PERAK: at Tapa Batang Padang, *Wray* 176!; in hilly forest up to 300 m. alt., *King's Collector* 4352!, 5706!, 5726!, 6128!, 7599!, 8541!, 10286!, 10594!. MALACCA: *Griffith* K. D. 4343!; *Maingay* K. D. 1280!, 1280/2!, 1299!; *Ridley* 7122!; at Ayer Panas, *Derry* 1038!. PAHANG: at Kwala Brok, *Ridley* 2263!. SINGAPORE: at Bukit Timah, *Cantley* 20!; Garden jungle, etc., *Ridley* 4136!, 4816!, 4817!.—DISTRIB. Burma.

7. *KNEMA WRAYI*. Warb. Monog. Myrist. 572, t. xxiv. (1897). A tree reaching to 30 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets rather slender, glabrous, pale, striate. *Leaves* thinly coriaceous; narrowly elliptic or elliptic-oblong, acute or subacute rarely acuminate at apex, rounded or subcuneate at base; both surfaces glabrous, shining above, glaucous beneath; 16—24 cm. long, 6—9 cm. broad; midrib prominent beneath; main nerves 13—20 pairs, prominent beneath, parallel, nearly straight at first, then curved along the margin but scarcely interarched; transverse nervules very many, close, parallel, prominent, netted with the reticulation; petiole 10—12 mm. long. *Flowers*: ♂ in many-flowered compound rusty-puberulous umbels from short woody axillary tubercles; pedicels slender, 7—10 mm. long, bearing the small oblong pubescent bracteole above the middle; perianth in bud 3—4 mm. in diam., subglobose, lobes 3—4 ovate, thick, ridged inside; androecium on a short stout stalk, disc subtriangular, flat or subconvex, anthers 13—17 on short filaments, horizontal: ♀ not known. *Fruit* oblong-ovoid or ovoid 2.5—4.5 cm. long, 1—2.5 cm. broad, in axillary pedicellate pairs, cinereous, glabrescent, pericarp yellow. *Seed* oblong-ovoid or ovoid; arillus entire, thin, tough, completely enveloping the testa. King Ann. Calc. III. 315, t. 151.

PERAK: at Ulu Seding, *Wray* 2006!; in forest up to 150 m. alt., *King's Collector* 5299!, 6514!, 6521!, 7475!, 8277!, 10444!, 10691!. SINGAPORE: at Jurong, *Ridley* 3873!.

8. *KNEMA CONFERTA*, Warb. Monog. Myrist. 578, t. xxiv. (1897). A tree reaching 18—24 m. in height and 45—60 cm. in diam. of stem; branchlets rather stout, pale brown, striate, glabrous, the youngest densely covered with short stellate or branched rusty

tomentum. *Leaves* subcoriaceous; oblong or oblong-lanceolate, acute or acuminate at apex, rounded or slightly cordate at base; both surfaces minutely reticulate, the upper glabrous, shining, the lower when young and specially on the nerves with minute loose scurfy tomentum, ultimately glabrous and subglaucous; margins recurved; 13–27 cm. long, 4.5–6.5 cm. broad; midrib moderately stout, keeled above; main nerves 14–28 pairs, parallel, straight, curved and interarching near the margin; transverse nervules very many, subparallel, closely netted with the reticulation; petiole stout, 10–15 mm. long. *Flowers*: ♂ in densely crowded axillary clusters of 20–30 on woody tubercles, rusty-pubescent; pedicels 7–10 mm. long with the bracteole about the middle; perianth in bud subglobose, depressed, bluntly 3-angled, about 4 mm. in diam., the teeth broadly triangular, acute fleshy, glabrous within; andræcium on an obconic striate stalk, the disc concave and sometimes slightly mammillate in the centre at first, afterwards flat, triangular; stamens 8–18 on short filaments, at first recurved, afterwards flat or even suberect: ♀ larger than ♂ but in smaller clusters obovoid or urceolate with 3 short subacute teeth; ovary depressed-globose, rufous-tomentose, style narrow, stigma cupshaped with lobed margins. *Fruit* axillary solitary or in pairs, ovoid, blunt, 3.5–4 cm. long, 2–2.5 cm. in diam., shortly rufous-pubescent when young, glabrescent when ripe, the pericarp thick. *Seed* ellipsoid, pointed; arillus covering the whole testa, minutely lacinate at the apex. *Myristica conferta*, King Ann. Calc. III. 365, t. 150.

PENANG: at Pulau Boetong, *Curtis* 2770!. PERAK: at Taipeng, *Wray* 2377!; in dense jungle on low wet ground, *King's Collector* 6211!, 10295!. PAHANG: at Pulau Chengai, *Ridley* 2264!. MALACCA: *Griffith* K.D. 4345!; *Maingay* K.D. 1289!, 1294!. SINGAPORE: *Maingay* K.D. 1297!; at Bukit Mandai, *Ridley's Collector* 442!.—  
DISTRIB. Andamans, Borneo.

Var. *Scortechinii*, Warb. *Leaves* longer, 16–32 cm. long, with thicker petioles. *Andræcium* with flatter disc, the stamens horizontal with rather longer filaments. *Fruit* ovoid-globose shorter, longer pedunculate, the pedicels of the ♀ longer, 11–12 mm. *Myristica Scortechinii*, King Ann. Calc. III. 317, t. 153.

PERAK: at Goping, *Scortechinii* 178!; at Gunong Batu Pateh 1300 m. alt., *Wray* 285!, at Tapa, *Wray* 1422!; in hill forests from 100 to 450 m. alt., *King's Collector* 5617!, 5939!, 6043!, 6694!, 7926!, 10635!.

I have followed Warburg in reducing King's *M. Scortechinii* to a variety of *M. conferta*, but I cannot help feeling a little doubt in the matter. It is possible that further investigation on the spot will restore it to specific rank.

9. *KNEMA FURFURACEA*, Warb. Monog. Myrist. 581, t. xxiv. (1897). A tree reaching 18—24 m. in height and 60—90 cm. diam. of stem; branchlets stout, the younger ones densely covered with a thick furfuraceous tawny tomentum, the older glabrous with black bark much cracked. *Leaves* coriaceous; narrowly oblong-lanceolate, acute or acuminate at apex, cordate at base; upper surface shining, pale brown when dry, lower dull, reddish-glaucous, glabrous except on the midrib beneath; 10—50 cm. long, 3—13 cm. broad; midrib stout, broad at base, prominent, often rusty-tomentose beneath; main nerves 18—36 pairs, prominent, parallel, at first straight, then curved to and along the margin but scarcely inter-arching; transverse nervules subparallel, distinct, enclosing the rather obscure reticulation; petiole very stout, 10—14 mm. long, at first densely rusty-tomentose, afterwards glabrous. *Flowers*: ♂ in 6—8-flowered densely rusty-pubescent umbels from woody tubercles in the axils of the leaves or of fallen leaves; pedicels 7—10 mm. long, bearing the minute bracteole about the middle; perianth in bud obtusely trigonous subglobose, 4—5 mm. in diam., divided into 3 blunt triangular teeth, glabrous inside; androecium on a stout obconic furrowed stalk, the disc circular or slightly 3-angled, anthers 10—13 on the disc margin, curving upwards so as to open vertically: ♀ in fewer-flowered umbels, sessile, the bracteole at the base of the perianth, obovoid, 7—8 mm. long, with 3 teeth; ovary sessile, globose, densely rufous-tomentose, stigma sessile, concave, many-toothed. *Fruit* subglobose at first and densely rufous-tomentose, when ripe ovoid or ellipsoid, blunt, 2.5—3.5 cm. long, pericarp thick. *Seed* elliptic or oblong; arillus thin, completely enveloping the whole of the testa except at the extreme apex where it is divided into 5 or 6 narrow lobes. *Myristica furfuracea*, Hook. f. & Th. Fl. Ind. 159; A. DC. Prodr. xiv. 1. 206; Miq. Fl. Ind. Bat. I. 2. 70; Hook. f. Fl. Br. Ind. V. 112; King Ann. Calc. III. 318, t. 155. *M. longifolia*, Hook. f. & Th. l.c. 156 (*the Malayan material*).

PENANG: *Porter*!; *Phillips*!; various places, *Curtis* 1459!, 2456!, 2769!, 2827!. PERAK: in dense forest from the plain up to 360 m. alt., *King's Collector* 5600!, 5720!, 5819!, 6025!, 6059!, 6515!, 7551!, 10349!. MALACCA: *Griffith* K.D. 4346!; *Maingay* K.D. 2287!, 1288!; at Tubong, *Goodenough* 2001!; at Batu Tigali,

*Holmberg* 773!. SINGAPORE: *Cantley* 69!; *Murton* 150!.—DISTRIB. Sumatra (*Forbes* 2694!).

10. *KNEMA OBLONGIFOLIA*, Warb. Monog. Myrist. 586. t. xxiv. (1897). A shrub or small tree reaching 12 m. or more in height, stem slender; branchlets slender, at first minutely scurfily rusty-tomentose, afterwards subglabrous, the bark pale brown. *Leaves* membranous; oblong or oblong-lanceolate or -oblanceolate, rarely elliptic, acute or shortly acuminate at apex, truncate or cordate at base; upper surface glabrous, shining, lower dull, glaucous, when young with much loose stellate rufous hair; 15—40 cm. long, 4—10 cm. broad; midrib rather thick, prominent, impressed and keeled above; main nerves 20—28 pairs, spreading, parallel, sometimes distant, sometimes close, curved near the margin and the upper ones only interarching; transverse nervules rather obscure, subparallel; reticulation obscure; petiole stout, 1—2 cm. long, rufous-tomentose when young. *Flowers*: ♂ in 4—12-flowered umbels from short, woody, axillary tubercles; pedicels 5—10 mm. long, bearing the minute bracteole at the summit; perianth in bud obovoid or suburceolate, obtuse, 4 mm. long, 3 mm. in diam., lobes 3 broadly triangular, ribbed and glabrous within; andræcium on a long cylindrical stalk, as long as the tube, disc very small, concave; anthers 6—10, sessile, suberect on the disc margin: ♀ sessile, in short but stoutly pedunculate 4—6-flowered axillary umbels; buds ovoid, lobes of perianth ovate blunt, glabrous within; ovary sessile, ovoid-conic, rusty-tomentose; style short; stigma of 2 rounded compressed lobes. *Fruit* in pairs or solitary, axillary, shortly peduncled, obovoid or ovoid, slightly pointed, sharply ridged, 3—3.5 cm. long, 2—2.5 cm. in diam.; pericarp thin, densely covered with harsh short rusty tomentum; peduncle 4 mm. long. *Seed* ovoid, mottled; arillus thin, deeply lobed, covering only the lower half of the testa. *Myristica oblongifolia*, King Ann. Calc. III. 313, t. 148.

PENANG: on rocky ground at about 250 m., *King's Collector* 1372!; *Curtis* 1044!. PERAK: in forest on low ground and up to 250 m., *King's Collector* 835!, 4534!, 5983!, 8645!. SELANGOR: Pahang Track, *Ridley* 8504!; Ginting Bidai, *Ridley* 7627!. MALACCA: at Ayer Panas, *Derry* 1038!. SINGAPORE: Garden jungle, *Ridley*!.

Var. *monticola*, King. *Leaves* smaller, 15—25 cm. long, subacute or rounded at base, the nerves fewer, the petiole more slender. *Flowers*: ♂ almost sessile on elongated tubercles, the stalk of the andræcium longer. A hill variety.

PERAK: *Scortechini*!; at lower camp, Gunong Batu Patch, 1000 m. alt., *Wray* 993!, 1077!, 1087!; in hilly forest at 750—1050 m. alt., *King's Collector* 3582!, 3810!, 6330!, 8322!, 10953!.

11. KNEMA MISSIONIS, Warb. Monog. Myrist. 602, t. xxv. (1897). A tree 6 to 15 m. high; branchlets slender, dark brown, minutely tawny-pubescent when young, ultimately glabrous and striate. *Leaves* membranous to chartaceous; oblong-lanceolate or oblanceolate or linear-oblong, acute or shortly acuminate at apex, attenuate at base, or sometimes rounded; both surfaces glabrous, upper shining, lower glaucous; 10—15 cm. long, 2—5 cm. broad; midrib slender, slightly impressed above; main nerves 13—16 pairs, slightly raised above, parallel, curving and interarching near the margin; transverse nervules irregular, reticulation obscure; petiole slender about 1 cm. long. *Flowers*: ♂ in rusty-puberulous umbels of about 8 on axillary or lateral tubercles which are at first short but elongate gradually to nearly 1 cm. long; pedicels slender, 5—7 mm. long with the bracteole near the summit; perianth in bud depressed globose, trigonous, about 3 mm. in diam., scurfy pubescent without, lobes 3 triangular, glabrous within; andrœcium on a short thick stalk, the disc subconcave bearing the 10—12 anthers suberect on its margin: ♀ in similar umbels on similar tubercles; pedicel much shorter with the bracteole close under the perianth; perianth urceolate, scurfily pubescent without, the lobes triangular; ovary conoidal, densely rusty-villous; style short, stigma bilobed, the lobes often again bifid. *Fruit* subglobose, rusty-pubescent, finally nearly glabrous, apiculate, 18 mm. long, 14 mm. in diam.; pericarp thin. *Seed* subglobose, smooth; arillus entire or only fimbriate at the apex *Myristica missionis*, Wall. Cat. 6788; King Ann. Calc. III. 321, t. 158. *M. lanceolata*, Wall. Cat. 6794. *M. corticosa*, Hook. f. & Th. Fl. Ind. 158 (*in part*); A. DC. Prodr. xiv. 1. 205 (*in part*); Miq. Fl. Ind. Bat. I. 2. 69 (*in part*). *M. glaucescens*, Hook. f. Fl. Br. Ind. V. 111 (*in part*). *M. sphærule*, Hook. f. Fl. Br. Ind. V. 859.

TONGKA: at Puket; *Curtis* 2925!. KEDAH: at Pulau Songsong, *Curtis*!. PENANG: *Wallich* 6788!; *Curtis* 700!, 935!. PERAK: *Caniley*. MALACCA: *Griffith* K.D. 4344!; *Miller* 9!; *Maingay* K.D. 1282!, 1299!; *Hervey*!; *Cuming* 2315!; *Caniley*! (*M. sphærule* Hk. f. type). PAHANG: at Pulau Manis, *Ridley* 2262!. SINGAPORE: *Wallich* 6794!; *Ridley* 4816, 4817, 6447!?.—DISTRIB. Burma, Borneo.

12. KNEMA GEMINATA, Warb. Monog. Myrist. 804, t. xxv. (1897). A tree: young branches slender, rufous-furfuraceous, ulti-



mately glabrous, with two obscure ridges decurrent from the leaf-bases. *Leaves* pergamaceous; oblong lanceolate, subacuminate at apex, cuneate or rounded at base; upper surface shining, lower glaucescent, when young golden rusty-tomentose; 8—14 cm. long, 2.5—4.5 cm. broad; midrib slender, main nerves 12—16 pairs, thin but prominent beneath, spreading, curving near the margin and rather obscurely interarching; transverse nervules irregular, obscure as is the reticulation; petiole about 1 cm. long, slender, dark, channelled. *Flowers*: ♂ in 3—4-flowered sessile umbels on short axillary tubercles; pedicel slender, 6 mm. long, the bracteole above its middle; perianth in bud subglobose, rufous-puberulous, 3 mm. in diam., lobes 3, subacute, glabrous and striate within; androecium on a short glabrous stalk, the disc flat, glabrous, with 9—10 sessile radiate anthers on its margin, curving upwards: ♀ not known. *Fruit* axillary, usually in pairs, often solitary, ellipsoid or ovoid, blunt at apex, narrowed at base, ridged at the sides, 2—2.5 cm. long; pericarp thin. *Seed* shining; arillus thin, fleshy, entire, slightly lacinate below the apex. *Myristica geminata*, Miq. Fl. Ind. Bat. Suppl. 385, Ann. I. 207; King Ann. Calc. III. 322, t. 160.

PENANG?: *Curtis* 3679!. PERAK: at Kurow, *Scortechini* 1527!. JOHORE: at Gunong Palai, *G. King*!.—DISTRIB. Burma, Sumatra (*Forbes* 2911!).

13. KNEMA LAURINA, Warb. Monog. Myrist. 606, t. xxiv. (1897). A tree reaching 12—20 m. in height and 30—45 cm. in diam. of stem; branchlets rather stout, pale brown, faintly striate, the youngest harshly rufous-tomentose. *Leaves* chartaceous; oblong or oblong-obovate or oblanceolate, acute or acuminate at apex, rounded or subcordate, often unequally, at base; upper surface shining, glabrous, lower surface tomentose, thickly on the nerves, sparsely on the parenchyma between them, hairs stellate; margin slightly recurved; 10—30 cm. long, 4—10 cm. broad; midrib rather slender, raised above; main nerves 12—24 pairs, parallel, impressed above, spreading, curved near the margin and more or less interarching; transverse nervules thin, subparallel, enclosing the minutely netted areolation; petiole about 1 cm. long, thick, rufous-tomentose. *Flowers*: ♂ in dense, axillary, rufous-tomentose, many-flowered umbels on thick tubercles; pedicel 2—3 mm long, bearing under the perianth the rather large ovate bracteole; perianth in bud obovoid, 3—4 mm. long, 3-lobed; androecium long-stalked, the stalk widening afterwards, striate, 2 mm. long, disc small, glabrous, concave, bearing

6—9 erect sessile anthers: ♀ in umbels on tubercles as in ♂; ovary sessile, depressed-globose, densely rufous-tomentose; style 0, or very short; stigma 2-lobed, the lobes patent, toothed. *Fruit* ovoid or ellipsoid, 2.5—3 cm. long, 1.5—2 cm in diam.; pericarp leathery, densely covered with coarse rufous tomentum. *Seed* ellipsoid; arillus thin, red, entire, completely enveloping the testa. *Myristica laurina*, Bl. Rumph. I. 189, t. 61; DeVriese Pl. Reinw. 96; Miq. Fl. Ind. Bat. I. 2. 71 and Suppl. 385; Hook. f. Fl. Br. Ind. V. 112 (excluding spec. *Maingay*); King Ann. Calc. III. 319, t. 156; Koord. & Val. Bijdr. IV. 186. *M. tomentosa*, Bl. (non Thunb.) Bijdr. 577.

PENANG: Pulau Boetong Reserve, *Curtis* 1191!; Moniot's road, *Curtis* 2457!. PERAK: Waterloo, *Curtis* 2728!; at Haram Parah, etc., *Scortechini* 54!, 830!, 831!; in thick forest at 100—300 m. alt., *King's Collector* 4307!, 5092!, 7452!, 7686!. MALACCA: at Bukit Panchur and Batu tiga, *Derry* 485!, 979!; at Sungei Hudang, *Ridley* 1800!. SINGAPORE: *Ridley* 2044!.—DISTRIB. Java, Sumatra, Borneo, etc.

14. KNEMA RETUSA, Warb. Monog. Myrist. 642, t. xxv. (1897). A tree, reaching 12—18 m. in height and 40—50 cm. in diam. of stem; branchlets stout, striate, pale brown and cinereous when dry. *Leaves* very large, coriaceous; oblong, elliptic-oblong or -obovate, obtuse or retuse at apex, rounded or subcordate at base; upper surface glabrous, shining, lower pale brown or whitish from a uniform layer of dense minute cinnamomeous hairs; margins recurved; 35—55 cm. long, 14—21 cm. broad; midrib stout, impressed above; main nerves 16—24 pairs, spreading subhorizontally and straight near the base, gradually more and more curved towards the apex and interarching; transverse nervules many, subparallel, prominent above; petiole stout, 1—2 cm. long. *Flowers* not known. *Fruit* 2—3 together on short thick tubercles from the scars of fallen leaves, ovoid, apiculate, gibbous on one side at the base, 5—6 cm. long, 5 cm. in diam.; pericarp thick, minutely rufous-tomentose. *Seed* narrowly obovoid, smooth; arillus very small, merely embracing the base of the seed, thin, much fimbriate. *Myristica retusa*, King Ann. Calc. III. 330, t. 171.

PERAK: in dense jungle, Gunong Bubu range, 150—250 m. alt., *King's Collector* 7690!.

## Family CIMONIMIACEÆ.

Trees or shrubs, rarely scandent, often aromatic. *Leaves* opposite, rarely alternate, entire or serrate, usually coriaceous, exstipulate. *Flowers* 1—2-sexual, regular, usually in short cymes or racemes; bracts small or 0, or 2 valvately enclosing the bud. *Perianth* inferior, globose ovoid or depressed, rarely campanulate; limb 4—many-toothed, teeth in one or several series, equal, or the outer sepaloid and the inner petaloid, sometimes obsolete when the perianth is calyptrate. *Stamens* few or many in one or many series on a disk adnate to the perianth tube, included; filaments short, simple or with basal scales; anthers erect, 2-celled, opening by slit or by valves opening upwards; staminodes in ♀ flowers usually none. *Carpels* many or rarely solitary, sessile on the disk or on the sides of the perianth-tube, or immersed in a disk, 1-celled; styles long or short, stigma small; ovule solitary, erect or pendulous, anatropous or orthotropous. *Fruit* a drupe, free or enclosed in the disk or on a discoid receptacle, indehiscent. *Seed* erect or pendulous; testa membranous; albumen fleshy; embryo near the hilum and minute, cotyledons usually flattened; radicle superior or inferior.—DISTRIB. Genera 31, species 253 (according to Perkins and Gilg in Engler's Pflanzenreich), chiefly in tropical America, also in Africa, Australia and the Pacific Islands, a few only in tropical Asia.

Stamens 4, the anther-cells distinct and dehiscent				
longitudinally .. .. .	..	..	..	1. MATTHÆA.
Stamens 8, the 4 outer larger than the 4 inner, the				
anther-cells confluent .. .. .	..	..	..	2. KIBARA.

## 1. MATTHÆA, Blume.

Trees or shrubs. *Leaves* opposite, entire or subserrate, petiolate, glabrous. *Flowers* fasciculate in the axils of the leaves or at the nodes of the branches below them, monœcious, pedicelled. *Perianth* depressed-turbinate, with 4 minute lobes at the nearly-closed mouth, at length circumsciss, the top dehiscent. *Stamens* 4 on the flattened receptacle of the ♂ flower; filaments very short; anthers ovoid, 2-celled, longitudinally dehiscent; pistillode of ♂ flower minute. *Carpels* many, on the broad flattened receptacles of the ♀ flower; style short, conical; ovule solitary, pendulous, anatropous. *Fruit* a fleshy pedunculate drupe, one or several on the persistent enlarged flattened receptacle. *Seed* pendulous; albumen fleshy; cotyledons

small, flat; radicle clavate, superior.—DISTRIB. About 3 species in the Malay Peninsula and Archipelago.

Perianth of ♂ convex in bud, leaves under 20 cm. long.

Leaves oblong, 3—6 cm. broad .. .. 1. *M. SANCTA*.

Leaves oval-oblong, 4—8 cm. broad .. .. 2. *M. LATIFOLIA*.

Perianth of ♂ concave in bud, leaves over 20 cm. long,

6 cm. broad .. .. 3. *M. CALOPHYLLA*.

1. *MATTHEA SANCTA*, Blume Mus. Bot. Lugd.-Bat. II. 90., t. x. (1849). A tree, reaching 12 to 15 m. in height and 25—40 cm. in diam. of stem; branchlets smooth, glabrous, ashy-grey, terete, the uppermost somewhat flattened. *Leaves* chartaceo-coriaceous; oblong, rather abruptly short- or long-acuminate at apex, acute at base; margins entire, recurved; both surfaces glabrous, glossy green when fresh, greyish when dry especially beneath; 10—20 cm. long, 3—6 cm. broad; midrib stout, prominent, keeled above; main nerves 6—9 pairs, more or less impressed above, prominently raised beneath, curved outwards and joined near the margin by prominent intramarginal arches; secondary nerves between the main nerves also joining the arches and often branched; reticulation irregularly netted; petiole stout, twisted, channelled, 4—10 mm. long. *Flowers* in subumbellate cymes or fascicles in the axils of the leaves or of fallen leaves; bracts small, pubescent; peduncles stout, puberulous, about 5—10 mm. long; pedicels slender, pubescent, flattened, those of ♀ 2—4 cm. long, enlarged in fruit, those of ♂ flowers shorter; perianth turbinate, that of ♂ flowers 4—5 mm. broad with conical apex and 4 minute lobes, that of ♀ flowers 6—13 mm. broad with depressed apex and obscure lobes, circumsciss at the broadest point. *Stamens* 4, filaments very short, connective broad. *Carpels*  $\infty$ , subulate, pubescent. *Fruit* an ovoid drupe about 2—2.5 cm. long by 1—1.5 cm. in diam., angled, many together, stalked, on the enlarged perianth base; pericarp crustaceous, indigo-blue when ripe. *Seed* oblong, about 1.5 cm. long, with prominent funicle and broad hilum; albumen thick; cotyledons ovate-oblong, flattened, 4—6 mm. long; radicle as long as cotyledons, thick. A. DC. Prodr. xvi. 2. 670; Miq. Fl. Ind. Bat. I. 2. 74; Hook. f. Fl. Br. Ind. V. 115; Perkins & Gilg in Engl. Pflanzenreich IV. 52, fig. 10, 1—4 and xlix 18.

PERAK: Wray 2811!; at Gunong Haram, *Scortechini* 704!; in dense forest on mountains near Thaiping and Larut at 700—1200 m. alt., *King's Collector* 6380!, 8455!. MALACCA: *Maingay* K.D. 1308!. SINGAPORE: Garden jungle, *Ridley* 107!—DISTRIB. Sumatra, Borneo.

2. *MATTHÆA LATIFOLIA*, Perk. in Engler's Bot. Jahrb. xxv. 563, fig. 10, 5—7 (1898). A glabrous shrub or small tree; branchlets greyish with yellowish patches and lenticels. *Leaves* chartaceo-coriaceous; oval or oval-oblong, shortly acuminate at apex, rounded-cuneate at base; glabrous on both surfaces, the upper greenish when dry, the lower reddish-brown except the nearly white nerves; margins slightly recurved; 10—20 cm. long, 4—8 cm. broad; midrib rather slender, prominent, keeled above; main nerves 8—10 pairs, prominent on the under surface, curving outwards to join in prominent intramarginal loops; secondary nerves between the main nerves also joining the arches and branched; reticulation loose, irregular; petiole 1—1.5 cm. long. *Flowers* in umbels on axillary or lateral tubercles, pedicels 5—6 mm. long, ♂ 1—1.5 mm. in diam.; receptacle depressed-cupular; ♀ 4—5 mm. broad, flattened. *Stamens* 4, filaments very short, anthers ovoid. *Carpels*  $\alpha$ , subulate, pubescent. *Fruit* a bluish-red ovoid drupe 15—17 mm. long, 5—7 mm. in diam.; pericarp crustaceous. Perk. in Engl. Pflanzenreich iv. 52, t. 10, 5—7 and xlix. 17, t. 7 B.C.

MALACCA: *Maingay* 1308!.—DISTRIB. Java (cult.).

The description is partly taken from Miss Perkins'—it does not seem to me that it differs much from *M. sancta*. The sheets in the Calcutta Herbarium show narrower leaves than do the specimens at Kew.

3. *MATTHÆA CALOPHYLLA*, Perk. in Engl. Bot. Jahrb. xxv. 563 (1898). A tree (?); branchlets smooth, pale brown, glabrous except when quite young, innovations tawny-pubescent; pith large. *Leaves* submembranous; ovate- or elliptic-oblong, abruptly cuspidate-acuminate at apex, rounded or subacute at base; both surfaces glabrous, the lower slightly reddish when dry; margins entire, cartilaginous; 20—30 cm. long, 7—9 cm. broad; midrib stout, main nerves 8—10 pairs, pale, the lowest pair from quite at the base, the rest distant, curving upwards and joining, especially the upper ones, in broad arches, outside which are smaller arches forming intramarginal nerves; secondary nerves and reticulation also pale, irregular, branching; petiole straight, 1.5—2 cm. long, channelled. *Flowers* in short subumbellate pubescent cymes in the axils of the leaves or of fallen leaves; rhachis very short; pedicels slender, flattened, 1—2 cm. long, bracteolate about the middle, elongating and thickening in fruit; perianth in ♂ obovate-globose, 6 mm. in diam., deeply concave; in ♀ depressed globose, 5 mm. in diam., the apex conical,

circumsciss at the broadest part, the top calyptrate deciduous, the base not much (up to 6 mm.) enlarged in fruit. *Stamens* 4, sessile, the anthers ovate. *Carpels* many, glabrous except for villous hairs at the base; style curved, subulate; ovule rather large. *Fruit* (immature) an ovate slightly angled drupe 12—15 mm. long on a slender stalk about 10 mm. long, several together on the only slightly enlarged perianth base; pericarp black when dry. Perk. and Gilg in Engl. Pflanzenreich IV. 52 and XLIX. 16. t. 7 A.

SINGAPORE: at Bidasi, Angmoko, Bukit Timah, Chanchu Kang, etc., Ridley 9165!.—DISTRIB. Borneo (Sarawak, Beccari 3236!), Philippines.

## 2. KIBARA, Endl.

Trees or shrubs. *Leaves* opposite, entire or dentate. *Flowers* monœcious, small, in axillary or lateral cymes or panicles; bracts very small. *Perianth* ovoid, globular or hemispherical, nearly closed by 4 short lobes in 2 series, those of ♂ erect, those of ♀ inflexed, hooked; pedicels usually long; in fruit the ♀ perianth circumsciss above the disk which is much enlarged and often reflexed. *Stamens* 5—8, 2-seriate; filaments thickened; anthers 1-celled, opening vertically in 2 unequal valves; staminodes in ♀ flowers 0. *Carpels* many, free, on the inside of the urceolate perianth; style very short; ovule 1, pendulous, anatropous. *Fruit* a fleshy sessile or stipitate drupe, many together seated on the enlarged perianth-tube. *Seed* conform to the drupe; testa membranous; albumen fleshy; cotyledons flat, leafy, ovate; radicle thick, superior.—DISTRIB. According to Perkins and Gilg 15 species, in the Malay Peninsula and Archipelago.

The latest work on this genus is that by Miss Janet Perkins in Engler's Bot. Jahrb. xxv. (1898) and in Engler's Pflanzenreich Heft 4 (1901) and Nachtrage Heft 49 (1911). In describing the species of the genus *Kibara* she refers to three of the four species described from the Malay Archipelago by Blume in his Mus. Bot. Lugd.-Bat. Vol. II, pp. 88, 89, different Malay Peninsula specimens which in the Flora Indica and Flora of British India had been placed under *K. coriacea*, Endlicher, as they had previously been placed by Miquel in the Fl. Ind. Bat. Thus: Griffith's No. 4365 from Malacca is referred to *K. cuspidata*, Blume, as is Maingay's No. 1307; while Curtis' 2255 from Penang is attributed to *K. chartacea*, Blume, *K. coriacea* is considered as only a Javanese species, with its variety *serrulata* first raised to specific rank and then in the Nachtrag reduced to varietal. Miss Perkins lays much stress on the texture of the leaves and I have found it very difficult to follow her in



this. The series of specimens belonging to the Calcutta Herbarium at my disposal seemed to me as regards leaves to be very difficult to separate, and I found it difficult to obtain characters from the flowers and fruit. After much consideration it appeared to me that the best characters were to be got from the inflorescence, and I consequently have thought it best to try and follow Miss Perkins as far as possible and to arrange the material accordingly. I cannot say that I am fully satisfied with the result, but I do not see my way to anything better and I should greatly hesitate to make new species of any of the material without better reasons than I can give at present. I have consequently divided the material among the four species *K. chartacea*, *K. cuspidata*, *K. coriacea* and *K. serrulata*, the best-marked of which is probably the last. It is quite possible that the next monographer will reduce at any rate the first three to one species.

Inflorescence 2—3 cm. long	..	..	1. <i>K. CUSPIDATA</i> .
Inflorescence to 10 cm. long	..	..	2. <i>K. CHARTACEA</i> .
Inflorescence to 14 cm. long.			
Pedicels 6—7 mm. long	..	..	3. <i>K. CORIACEA</i> .
Pedicels 20—25 mm. long	..	..	4. <i>K. SERRULATA</i> .

1. *KIBARA CUSPIDATA*, Blume in Mus. Bot. Lugd.-Bat. II. 89 (1852—56). A shrub or small tree reaching at most 4—5 ft. in height; branchlets stout, smooth. *Leaves* chartaceous; ovate or elliptic, shortly cuspidately acuminate at apex, cuneate to almost rounded at base; both surfaces glabrous, yellowish when dry; margin recurved, entire or slightly and distantly serrate or undulate in the upper half; 12—30 cm. long, 6—15 cm. broad; midrib stout; main nerves 5—7 pairs, irregular, at first straight then curved, the upper ones to meet in loops at from 6 to 10 mm. from the margin; secondary nerves few, reticulation irregular, conspicuous on the under surface especially; petiole 1—2 cm. long, channelled above. *Flowers* in much-branching axillary pubescent cymes 2—3 cm. long; pedicels slender, up to 15 mm. long in ♂, stouter and up to 10 mm. in ♀; bracts deciduous, bracteoles as the perianth-tube minute, ovate; perianth-tube ovoid, lobes very small, hooked within in ♀. *Carpels* pubescent. *Drupe* ellipsoid, 15 mm. long, 10 mm. in diam., smooth, seated on the fleshy, lobed, enlarged receptacle; enlarged pedicels clavate, 8—10 mm. long. Perk. in Engl. Bot. Jahrb. 573 and Monog. 61, Nachtr. 33. *K. coriacea*, Endl.; Hook. f. and Th. Fl. Ind. 166 and Hook. f. Fl. Br. Ind. V. 114 in part only.

PENANG: Government Hill, 360 m., *Curtis* 1242!. PERAK: at Tupa, 60 m. alt., *Wray* 829!; at Ulu Bubong, in dense forest at 120—180 m. alt., *King's Collector* 10415!, 10455!. MALACCA: *Griffith* K.D. 4365!; *Maingay* K.D. 1307!.—DISTRIB. Sumatra.

KIBARA CHARTACEA, Blume in Mus. Bot. Lugd.-Bat. II. 89 (1852—56). A small tree reaching 7—8 m. in height; branchlets rather stout, smooth, pale brown. *Leaves* subcoriaceous; elliptic or ovate or ovate oblong, shortly cuspidate-acuminate at apex, acute or rounded at base; both surfaces glabrous, yellowish when dry; margin slightly recurved, entire or minutely distantly serrate on the upper half; 15—30 cm. long, 8—16 cm. broad; midrib fairly stout, raised above; main nerves 6—8 pairs, prominent, irregular, curved, the upper ones meeting in loops; secondary nerves and reticulation irregularly netted, prominent on the lower surface; petiole stout, channelled, 1.5—2 cm. long. *Flowers* in axillary pedunculate cymes reaching 10 cm. in length in fruit, branches dichotomous. *Drupe* ovate acuminate, up to 15 mm. long, 10—12 mm. in diam., slightly rugose; enlarged receptacle lobed; pedicel thick, about 5 mm. long. Perk. in Engl. Bot. Jahrb. xxv. 572 and Monog. 61. *K. coriacea*, Endl.; Hook. f. and Th. Fl. Ind. 166 and Hook. f. Fl. Br. Ind. V. 144 *in part only*.

PENANG: back of W. hill road to Batu Ferengy, *Curtis* 2255!; rocky jungle near Thaipeng, 250—300 m., *King's Collector* 8524!.—  
DISTRIB. Sumatra.

3. KIBARA CORIACEA, Tul. in Archiv. Mus. Hist. Nat. Paris VII. 404 (1855). A small tree, reaching 4.5 m. in height; branchlets rather stout, smooth, brown. *Leaves* subcoriaceous; ovate or oblong-ovate or -lanceolate, acute at apex, cuneate at base; both surfaces glabrous, yellowish when dry; margin entire or very distantly and inconspicuously toothed in the upper half; 16—22 cm. long, 7—10 cm. broad; midrib moderately stout; main nerves 6—8 pairs, curved, the upper ones meeting in loops about 5 mm. within the margin; secondary nerves few, reticulation irregular, prominent on the under surface; petiole 1—1.5 cm. long, channelled. *Flowers* in axillary or lateral, puberulous, panicles of cymules reaching 14 cm. in length; cymules subumbellate; pedicels curved, flattened, clavate, 6—7 mm. in length; bracteoles 2, near the base of the flower; perianth of ♀ circumscrib, the lobes deciduous. *Carpels* pubescent. *Drupe* ovoid, acute. Hook. f. and Th. Fl. Ind. 166 and Hook. f. Fl. Br. Ind. V. 114 *in part*; Miq. Fl. Ind. Bat. I. 2. 73; Perk. in Engl. Bot. Jahrb. xxv. 576, Monog. 63 and Nachtr. 35; Koord. Exkurs. Fl. Jav. II. 259. *K. Blumei*, Steud. Nomencl. Bot. I. 846; Bl. Mus. Bot. Lugd Bat. II. 88, t. ix.

PERAK: Singie Rajah, *King's Collector* 1005! —DISTRIB. Java, etc.

4. KIBARA SERRULATA, Perk. in Engl. Bot. Jahrb. 575 (1898). A tree reaching 12—15 m. in height (*Kunstler*), a large shrub (*Curtis*); branches stout, branchlets smooth, pale brown. *Leaves* chartaceous; oblong-ovate or -obovate, acuminate at apex and often sphacelate, attenuate to rounded at base; both surfaces glabrous, yellowish when dry; margins distantly serrulate in the upper half; 20—30 cm. long, 8—16 cm. broad; midrib stout, raised above; main nerves 7—8 pairs, very irregular, the lower curving to fade away in loops, the upper curving to meet in loops at about 5—10 mm. from the margin; reticulation irregular, prominent; petiole stout, 1—2 cm. long, channelled. *Flowers* in axillary subterminal or lateral pedunculate panicles of subumbellate cymes, reaching 10—15 cm. in length; pedicels of ♂ very slender, about 2 cm. long, of ♀ stouter, about 2.5 cm., both puberulous. *Stamens* and *Carpels* pubescent. *Drupe* ellipsoid, beaked, subrugose, 16 mm. long, 10 mm. in diam.; enlarged pedicels cylindric, 5 mm. long, receptacle 1—1.5 cm. broad. Perk. Monog. 62, t. 16 A.; Koord. Exkurs. Fl. Jav. II. 259. *K. Blumei*, Steud.; Blume Mus. Bot. Lugd.-Bat. II. 88, var. *serrulata*; Perk. Monog. Nachtr. 36.

PENANG: at Waterfall, *Curtis*!. PERAK: Ulu Telama, *Scortechini* 1307!; near Gunong Malacca, *King's Collector* 7205! —DISTRIB. Java.

#### Family CV. THYMELÆACEÆ.

Shrubs or trees with tough fibrous bark, rarely herbs. *Leaves* alternate or opposite, simple, quite entire. *Flowers* usually hermaphrodite, in axillary or terminal heads, umbels, clusters, spikes or racemes; bracts various, often forming an involucre. *Perianth* regular, tubular or campanulate, often corolline, 4—5-lobed, the lobes imbricate in bud, often with scales at their bases within. *Stamens* as many or twice as many as the lobes of the perianth, rarely half as many, adnate to the tube of the perianth, those opposite the lobes usually attached above the alternate ones; filaments short, rarely as long as the anthers; anthers erect, 2-celled, the cells parallel, dehiscing longitudinally. *Disk* hypogynous, annular cupular or of scales, sometimes 0. *Ovary* superior, 1—2-celled; ovules 1 in each cell, anatropous, pendulous from the apex of the cell; style short or long, terminal or excentric; stigma usually

capitate. *Fruit* a small berry drupe or capsule. *Seed* solitary or one in each cell, pendulous or lateral; albumen fleshy or 0; embryo straight; cotyledons fleshy, usually thick; radicle short, superior.—**DISTRIB.** About 40 genera, about 360 species, in temperate and tropical regions.

Ovary 1-celled, 1-ovuled; fruit indehiscent (Tribe 1. EUTHYMELEAE).

Perianth without scales, lobes 4; stamens as many as and opposite to the lobes or twice as many.

Leaves alternate; hypogynous disk usually 0 .. 1. DAPHNE.

Leaves usually opposite; hypogynous disk of 1—

4 membranous scales .. .. 2. WIKSTRÆMIA.

Perianth with scales above the stamens, lobes 5; stamens twice as many as lobes.

Stamens in one row; scales 10, free or connate in pairs, long .. .. 3. LINOSTOMA.

Stamens in two rows; scales 5, bifid or bilobed, short .. .. 4. ENKLEIA.

Ovary 2-celled, cells 1-ovuled; fruit a loculicidal capsule (Tribe II AQUILARIEAE) .. .. 5. AQUILARIA.

# 1. DAPHNE, L.

Erect or prostrate shrubs, sometimes small trees. *Leaves* alternate, scattered or congested, evergreen or deciduous. *Flowers* hermaphrodite, in terminal or lateral sessile or peduncled heads or short racemes, the heads sometimes with involucrate bracts. *Perianth* tubular or funnel-shaped; lobes 4, the throat without scales. *Stamens* in 2 superposed rows of 4 each; filaments short; anthers oblong. *Disk* hypogynous, tubular; often 0. *Ovary* 1-celled; ovule 1, pendulous; style short; stigma capitate. *Fruit* a fleshy or coriaceous drupe, globose or ovoid. *Seed* 1; testa crustaceous; albumen none or scanty; cotyledons fleshy, plano-convex.—**DISTRIB.** About 80 species, in subtropical and temperate Europe, Asia and N. Africa.

DAPHNE COMPOSITA, Gilg in Engl. and Prantl. Naturl. Pflanzenfam. III. 6 A. 238 (1894). A shrub or small tree reaching 3 to 6 m. in height and 10 cm. in diam. of stem (Kunstler); branchlets slender, brown, with fibrous inner bark, glabrous. *Leaves* membranous, lanceolate or oblong-lanceolate, acuminate at apex and at base; glabrous, dark green above, pale or glaucescent beneath; 8—18 cm. long, 2—5 cm. broad; midrib slender, pale beneath; main nerves 10—14 pairs, at first nearly at right angles with the midrib, curved near the margin where they anastomose; secondary nerves many,

prominent as is the reticulation; petiole slender, short, 2—5 mm. long. *Flowers* white, in heads of 5—9, sessile on a silky villous receptacle, on slender peduncles 2—7 cm. long; in bud protected by an involucre of 2 concave suborbicular reddish imbricating bracts pubescent to nearly glabrous without, minutely pubescent within. *Perianth* tubular, densely white-silky-villous without, glabrous within, 7—9 mm. long; lobes ovate, acute or obtuse, 2—3 mm. long, alternately short and long. *Stamens* 8, the upper 4 opposite the perianth-lobes, the lower 4 alternate with them; anthers oblong, yellow, 1 mm. long; filaments very short. *Ovary* glabrous below, densely silky-villous above; hypogynous disk membranous, brown, tubular, dentate, 1—1.5 mm. long; style slender; stigma large, capitate. *Fruit* an ovoid glabrous drupe, about 5 mm. long. Koord. Exkurs. Fl. Jav. II. 657. *D. pendula*, Smith Plant. Ic. ined. II. t. 34 (1790); Wickst. Monog. Daphn. 12; Meissn. in DC. Prodr. XIV. 540; Kurz For. Fl. II. 333; Hook. f. Fl. Br. Ind. V. 194; Miq. Fl. Ind. Bat. I. 1. 877. *D. montana*, Meissn. in Regensb. Denkschr. III. 284. *Scopolia composita*, Linn. fil. Suppl. 409 (1781). *Eriosolena montana*, Bl. Bijdr. 651; Hassk. Cat. Bogor. 92.

PERAK: at Bujong Malacca, *Ridley* 9682!, at Ulu Batang Padang, *Ridley* 13707!; Birch's Hill, *Wray* 510!; *Scortechini* 531!; in dense jungle on mountain tops, Larut, etc., at 1000—1400 m. alt., *King's Collector* 3812!, 6940!. SELANGOR: at Bukit Kutu, 900 m. alt., *Ridley* 7614!.—DISTRIB. Burma, Java (*Kurz*!, *Hasskarl*!, *Lobb* 247!, *deVries*!, *Forbes* 1103!), Sumatra (*Teysmann*!; *Beccari* 2!; *Forbes* 1856!, 2468!).

## 2. WIKSTROMIA, Endl.

Shrubs, rarely trees. *Leaves* opposite, rarely alternate. *Flowers* hermaphrodite, in terminal or axillary spikes or racemes, ebracteate. *Perianth*-tube slender, elongate; lobes 4, spreading, the throat naked. *Stamens* 8, in two series, the upper opposite the perianth-lobes near the mouth, the lower alternate with them at mid-tube; filaments short; anthers oblong. Hypogynous disk of 1—4 membranous scales, linear, free or joined below. *Ovary* sessile or subsessile, 1-celled; style very short; stigma large, capitate or globose. *Fruit* a fleshy or dry drupe, more or less included in the persistent base of the perianth; pericarp fleshy or membranous. *Seed* conform to the pericarp; testa crustaceous; inner testa, if present, membranous; albumen 0 or very scanty; cotyledons fleshy, plano-convex.—Dis-

TRIB. About 20 species, in Tropical and Eastern Asia, Australia and the Pacific Islands.

- Leaves subcoriaceous, 2—4 cm. long, 1—1.5 cm. broad;  
inflorescence terminal, under 1 cm. long .. 1. *W. VIRIDIFLORA*.  
Leaves submembranous, 3—9 cm. long, 1.5—3 cm.  
broad; inflorescence axillary, 1—2 cm. long or more 2. *W. CANDOLLEANA*.  
Leaves membranous, 5—13 cm. long, 2.5—4.5 cm.  
broad; inflorescence terminal, very short .. 3. *W. RIDLEYI*.

1. *WIKSTRÆMIA VIRIDIFLORA*, Meissn. in Denkschr. Regensb. Bot. Gesellsch. III. 206 (1841). A glabrous shrub; branchlets slender, dark brown, inner bark fibrous. *Leaves* opposite or subopposite, decussate, subcoriaceous; oblong or obovate, rounded at apex, cuneate at base; both surfaces reddish-brown when dry; 2—4 cm. long, 1—1.5 cm. broad; main nerves about 8—10 pairs, oblique, slender, irregular and often branched; petiole very short, 1—2 mm. long. *Flowers* in short few-flowered terminal spikes or fascicles, scarcely 1 cm. long. *Perianth*-tube 5—10 mm. long, glabrous, greenish-yellow, contracted at the mouth; lobes rounded, 2 mm. long, spreading. *Disk* of 2 or 4 slender scales, scarcely 1 mm. long, united in pairs. *Drupe* 6—7 mm. long, ovoid, scarlet. *Seed* acute at both ends; cotyledons thick. Meissn. in DC. Prodr. xiv. 2. 546; Benth. Fl. Hongk. 297; Miq. Fl. Ind. Bat. I. 1. 897; Prain Beng. Plants 906. *W. indica*, C. A. Mey. in Bull. Acad. Sc. Petersb. I. 357 (1843) var. *viridiflora*, Hook. f. Fl. Br. Ind. V. 195. *Daphne viridiflora*, Wall. Cat. 1049. *Diplomorpha? viridiflora*, C. A. Mey. l.c. 358.

KEDAH: Langkawi small islands, *Curtis* 3693!. PENANG: Government Hill, *Curtis* 1426!; at Balik Pulau, *Ridley* 8023!; on hills, *Deschamps*!. SINGAPORE: *Lobb*. 326!.—DISTRIB. India, Burma, Philippines, China.

2. *WIKSTRÆMIA CANDOLLEANA*, Meissn. in DC. Prodr. xiv. 544 (1857). A shrub (Wray, Curtis, etc.) or small tree reaching 4—6 m. in height and 5—7.5 cm. diam. of stem (Kunstler); branches slender, dark, with fibrous bark; branchlets slender, terete, dark brown, enlarged at the nodes. *Leaves* submembranous, opposite; ovate or elliptic-ovate or lanceolate, long acuminate at apex, acute or obtuse at base; upper surface dull, reddish-brown when dry, lower paler; margins recurved; 3—9 cm. long, 1.5—3 cm. broad; main nerves 8—12 pairs, irregular, prominent beneath, often branched; secondary nerves many, similar to the main nerves; reticulation rather obscure;



petiole very short, scarcely 1—2 mm. long. *Flowers* in axillary racemes, 1—2 cm. long, puberulous, gradually elongating, on slender peduncles 1 cm. long; pedicels very short, pubescent; flowers yellow or white, many, those not fruiting leaving prominent scars. *Perianth* tube slender, 6—8 mm. long; lobes 2—3 mm. long, alternately long and short, obtuse, incurved, glabrous. Hypogynous *disk* of 4 oblong scales, connected in pairs, 1—2 mm. long. *Ovary* ovoid, glabrous; style slender; stigma globose, papillose. *Drupe* ovoid, red, glabrous, 7 mm. long. Miq. Fl. Ind. Bat. I. 1. 879.

KEDAH: on Kedah Peak, *Ridley* 5482!. KELANTAN: at Campora, *Ridley*!. PERAK: at Gunong Batu Pateh, Gunong Bubu and Gunong Mas, at 1300—1500 m., *Wray* 204!, 3834!, 4136!; tops of hills at 1200—1300 m., *King's Collector* 2340!, 6985!; at Gunong Bubu, etc., *Scortechini* 336!, 792!; at Gunong Hijan 1800 m., *Curtis* 2055!, *Ridley* 2900!. PAHANG: at Kluang Terbang and Bukit Setampat Telom, etc., *Ridley* 10904!, 13705!, 13796!, 16092!.—DISTRIB. Java, Madura. The alpine specimens have smaller and more reddish leaves than those from lower levels.

3. WIKSTROMIA RIDLEYI, Gamble in Kew Bull. 200. (1912). A small shrub; branchlets slender, dark brown, terete, the uppermost puberulous, the nodes prominent. *Leaves* opposite, membranous; lanceolate, rather obtusely acute at apex or almost acuminate, acute at base or somewhat rounded; both surfaces olive-brown when dry, smooth, shining, glabrous; 5—13 cm. long, 2.5—4.5 cm. broad; midrib slender; main nerves about 8—10 pairs, obscure, irregular, oblique, with intervening occasional secondary nerves; reticulation obscure; petiole very short, 2—3 mm. long. *Flowers* yellow, in terminal few-flowered (5—6) fascicles, on peduncles about 5 mm. long; pedicels very short, pubescent. *Perianth*-tube slender, elongate, up to 10 mm. long, glabrous; lobes ovate, 4 mm. long, subequal. *Stamens* inserted below the throat of the tube, the two rows 2—3 mm. apart; filaments very short; anthers oblong, 1.5 mm. long. Hypogynous *disk* of 4 linear lobes, in two combined pairs, 1—2 mm. long, hyaline. *Ovary* obovoid, hirsute at apex; style slender; stigma large, papillose. *Drupe* with red fleshy pericarp, 6—7 mm. long, 5 mm. in diam. *Seed* with crustaceous outer and membranous inner testa; cotyledons very fleshy.

TRINGGANU: at Pulo Katam, *Ridley*!. PAHANG: at Pekan and Kwala Brawas, *Ridley* 1583!. (all in Herb. Singap.).

## 3. LINOSTOMA, Wall.

Erect or climbing shrubs. *Leaves* opposite or subopposite, penni-nerved. *Flowers* hermaphrodite, in small paniced sometimes umbelliform cymes; bracts 2, on the peduncle, subopposite, leafy, at length enlarged and membranous. *Perianth*-tube cylindric, the base at length turgid; lobes 5, spreading; scales 10, inserted on the mouth of the tube above the stamens, free or connate in pairs. *Stamens* 10, inserted at the mouth of the tube, sometimes alternately long and short; filaments slender, exserted, broadening above into the connective; anthers ovoid or oblong, obtuse, dehiscing longitudinally, the cells enclosing the broadened connective. Hypogynous *disk* 0, or of a short lobed ring surrounding the base of the ovary-stalk. *Ovary* stipitate, long-hirsute, ovoid or oblong; style filiform; stigma capitate, penicillate; ovule 1. *Fruit* ovoid or globose included in or supported on the more or less cleft inflated base of the perianth-tube; pericarp red, crustaceous. *Seed* conform to the pericarp; testa membranous; albumen 0; cotyledons large, hemispheric, fleshy.—DISTRIB. Species 6, 3 in India and Malaya, 3 in S. America.

LINOSTOMA PAUCIFLORUM, Griff. in Calc. Journ. Nat. Hist. iv. 234 in note (1844). An erect or scandent shrub; branchlets long, slender, black when dry. *Leaves* opposite, chartaceous, glabrous; elliptic or obovate, obtuse or retuse and mucronate at apex, rounded or nearly acute at base; lower surface almost glabrous; margin entire, thickened from being closely reflexed; 2.5—5 cm. long, 1.5—2.5 cm. broad; main nerves very numerous, often nearly 50 pairs, at from 70°—90° with the midrib, parallel, ending in the margin; secondary nerves also numerous; reticulation obscure; petiole slender, up to 3 mm. long. *Cymes* terminal or axillary, few- (2—4-) flowered supported by pairs of leafy, white, ovate or ovate-oblong, floral leaves, thinner than and with fewer nerves than the regular leaves, reaching 4 cm. long by 2 cm. broad; peduncles filiform, glabrous; pedicels slender; flowers greenish-white. *Perianth*-tube slender, glabrous on both surfaces, somewhat constricted at mouth, 10-nerved, 1—2 cm. long; lobes 5 imbricate, 2 outer narrower than 3 inner, linear-oblong, 8—10 mm. long; scales clavate, crenulately rugose, about 5 mm. long. *Stamens* nearly as long as the corolla-lobes, the connective broadened and decurrent into the filament. *Disk* annular, lobed. *Fruit* enclosed in the slightly cleft, urceolate, enlarged, 10-ridged perianth-tube nearly 1.5 cm. long, pericarp glabrous, crustaceous. *Seed*

globose, 6—7 mm. in diam., testa membranous. Walp. Ann. I. 587; Meissn. in DC. Prodr. xiv. 2. 600; Kurz in Journ. As. Soc. Beng. xxxix. ii. 83 and in For. Fl. II. 334; Miq. Fl. Ind. Bat. I. i. 882; Hook. f. in Fl. Br. Ind. V. 198. *Psiloea dalbergioides*, Miq. Fl. Ind. Bat. Suppl. 355.

KEDAH: Langkawi island, *Curtis* !. PENANG: *Curtis* 713!. DIN-DINGS: Pangkore, *Scortechini* 983!; *Ridley* 8017!; at Lumut, *Ridley* 10289!. SINGAPORE: near Stativa, *Griffith* 4376!; *Maingay* 1308/3!; Bukit Timah, *Goodenough*!; Changi Soyang, *Ridley* 1858!.—DISTRIB. Burma (*Kurz*); Sumatra (*Sibogd*, West Coast, *Teysmann*!).

#### 4. ENKLEIA, Griff.

Scandent shrubs. *Leaves* alternate or subopposite, pinni-nerved. *Flowers* hermaphrodite, in terminal capitula on the branches of an elongated terminal panicle, each branch bearing bracts and two floral leaves, the said leaves usually small and bractiform, but in fruiting branches large, leafy, chartaceous, coloured and reflexed with the upper side downwards on thickened petioles. *Perianth*-tube tubular-ovoid, constricted below the throat; lobes 5, short, erect and incurved; scales 5, short, bifid or bilobed, behind the stamens on the throat of the perianth-tube. *Stamens* 10, in two rows on the upper part of the perianth-tube, the upper 5 just below the throat, the lower 5 a little below; filaments short, slightly broadening under the anthers; anthers 2-celled, the cells parallel, introrse, the connective not broadened. Hypogynous disk 0, or a very minute glabrous ring at the base of the ovary. *Ovary* sessile, ovoid; style short; stigma oblong, papillose; ovule 1, pendulous. *Fruit* a drupe supported at the base by the cleft remains of the perianth; pericarp woody. *Seed* conform to the pericarp; testa soft, sub-membranous; albumen 0; cotyledons fleshy, hemispheric.—DISTRIB. One species, perhaps another in the Andaman Islands.

ENKLEIA MALACCENSIS, Griff. in Calc. Journ. Nat. Hist. iv. 234 in note (1844). A climbing shrub with brown bark and decurved branches; branchlets, inflorescence and undersurface of leaves softly ferruginous-tomentose. *Leaves* alternate or subopposite, coriaceous; elliptic to suborbicular, broadly acute, rounded or retuse and mucronate at apex, obtuse or obtusely acute at base; upper surface dull, olivaceous when dry, lower softly tomentose; margin entire, thickened; 5—10 cm. long, 4—7 cm. broad; midrib stout, tomentose on

both surfaces, prominent beneath; main nerves about 15—20 pairs, at from 70°—80° with the midrib at first then arched to the margin; transverse nervules subparallel, oblique; reticulation obscure; petiole 8—12 mm. long, tomentose. *Panicles* elongate, up to 25 cm. long, 15 cm. broad; bracts small, near the bases of the branches; floral leaves of two kinds, the smaller linear-oblong 6—12 mm. long, the larger on fruiting branches leaf-like, pale brown, oblong-obovate, obtuse at apex and base, prominently nerved and reticulate, deflexed, the upper surface usually lowest, 5—6 cm. long, about 2 cm. broad, the petiole thick on a thickened base; heads terminal, subumbellate; bracteoles minute; buds clavate; flowers greenish-brown. *Perianth*-tube tubular-ovoid, constricted above, densely rusty-tomentose without, glabrous within, 5—6 mm. long; lobes short, 2—3 mm. long, incurved, villous within; scales 5, minute, obtuse, bilobed or bifid, glabrous. *Stamens* very small, filaments short, anthers oblong. *Ovary* densely white hirsute; style very short; stigma capitate. *Drupe* ovoid, prominently ribbed and reticulate, 12—15 mm. long, 1 cm. broad, beaked; pericarp woody; remains of perianth at base only; pedicel thickened. *Seed* subglobose, 6 mm. in diam.; testa softly membranous; cotyledons hemispheric; radicle rather large, acute. Walpers Ann. I. 588; Engl. & Prantl Naturl. Pflanzenfam. III. 6A. 231. *E. malayana*, Griff. Notul. IV. 363. *Lasiosiphon scandens*, Endl. Gen. Pl. Suppl. IV. Part 2. 67 (1847); Meissn. in DC. Prodr. xiv. ii. 598. *Linostoma scandens*; Kurz in Journ. As. Soc. Beng. xxxix. ii. 83 (1875) and For. Fl. II. 334; Miq. Fl. Ind. Bat. I. 1. 881; Hook. f. in Fl. Br. Ind. V. 198. *L. siamense*, Kurz l.l.c. *fide* Hook f.

MALACCA: *Griffith* 4375; at Ayer Punas, *Curtis* 3493!; at Sungei Udang, *Goodenough* 1674!; *Alwis*!. SINGAPORE: *Maingay* 1308/2!; *Schomburgk* 101!; in experimental garden, *Ridley* 5565!, at Bukit Timah, *Ridley* 6427!.—DISTRIB. Burma and Siam (*Kurz*).

##### 5. AQUILARIA, Lamk.

Trees. *Leaves* alternate, penni-nerved, glossy. *Flowers* hermaphrodite, pedicellate, in axillary or terminal peduncled umbellules, ebracteate. *Perianth* tube campanulate; lobes 5, spreading or reflexed; scales 10 on the throat of the perianth, densely pilose, connate below in a short ring. *Stamens* 10, alternate with the scales and below them; filaments short; anthers oblong, introrse, the cells often unequal. *Ovary* sessile, densely villous, 2-celled; style very

short; stigma large, capitate, papillose; ovules 2, pendulous. Hypogynous disk 0, or a very minute ring. *Fruit* a compressed obovate or oblanceolate 2-celled capsule, loculicidal; pericarp coriaceous or woody; placentas on the middle of the valves. *Seeds* 2 or 1 by abortion, ovoid, the base of each bearing a long caudiform appendix reaching to the bottom of the cell; testa crustaceous, tegmen soft, corky; albumen 0; cotyledons fleshy, plano-convex.—About 10—12 species, in India, Malaya, China and the Philippines to New Guinea.

Leaves glabrous, shining, under 10 cm. long; perianth

5 mm. long, puberulous; capsule obovoid, glabrous,

under 3 cm. long .. ..

1. *A. MALACCENSIS*.

Leaves puberulous beneath, dull, usually over 10 cm.

long; perianth 8—10 mm. long, grey-tomentose;

capsule oblanceolate, grey-tomentose, 4 cm. long .. 2. *A. HIRTA*.

1. *AQUILARIA MALACCENSIS*, Lamk. Dict. I. 49 (1783) and Ill. t. 356. A large tree reaching 18 to 24 m. in height and 60 cm. in diam. of stem; bark whitish, rather smooth; branchlets slender, pale brown, young ones pubescent; buds silky. *Leaves* chartaceous, glabrous; oblong-lanceolate or shortly oblong, acutely or obtusely caudate-acuminate at apex, rounded or attenuate at base; both surfaces shining, smooth; margins wavy, recurved and thickened; 6—10 cm. long, 2.5—4.5 cm. broad; main nerves 8 to 12 pairs, rather irregular, often branched, curving to the thickened margin and with secondary nerves between, also many very fine subparallel nervules; petiole thickened, 4—6 mm. long. *Umbellules* on axillary or lateral branchlets, about 6-flowered; peduncles 6—10 mm. long; pedicels slender, 3—4 mm. long. *Perianth*-tube campanulate, puberulous without, nearly glabrous and 10-ribbed within, 3 mm. long; lobes ovate, 2 mm. long, villous, reflexed in flower; scales 10, obtuse, densely pilose, 1 mm. long. *Stamens* below the scales, the anthers about as long. *Ovary* densely villous; style short; stigma capitate. *Capsule* broadly obovoid or oblanceolate, 2.5—3 cm. long, 2—2.5 cm. broad; pericarp woody, smooth outside or warted. *Seeds* ovoid, puberulous, beaked, 6—7 mm. long, the basal appendage as long and twisted. DC. Prodr. II. 59; Meissn. in DC. Prodr. xiv. 2. 602 *excl. citation of Benth.*; Dict. Sc. Nat. t. 248; Kurz For. Fl. II. 236; Miq. Fl. Ind. Bat. I. 1. 883 and Suppl. 356; Hook. f. Fl. Br. Ind. V. 200; Baillon Hist. des Pl. VI. 100, figs. 67—69; Gilg in Engl. & Prantl Naturl. Pflanzenfam. III. 6A. 224, Fig. 77B; Ridl. in Journ. R. As. Soc. Straits Br. xxxv. 73; Koord. Exkurs. Fl. Jav. 656. *A.*

*ovata*, Cav. Diss. VII. 377, t. 334. 'Agallochum Secundarium' Rumph. Herb. Amb. II. 34, t. 10.

PENANG: Government Hill and Waterfall, *Curtis* 1534!; Balik Pulau, *Ridley*!. PERAK: in hilly forest near Larut at 150 to 250 m. alt., *King's Collector (Kunstler)* 3569!; *Scortechini*!. PAHANG: at Kwala Luit, *Ridley* 2581!. MALACCA: *Griffith* 4382!; *Maingay K.D.* 553!, 1317!; at Brisu, *Derry* 1151!; at Sungei Udang, Bukit Bruang and Bukit Tampin, *Goodenough* 1355!, 1424!, 1873!; Bukit Sulu, *Alwis* 1600!. JOHORE: at Castlewood, *Ridley*!. SINGAPORE: *Kranji* and Garden jungle, *Ridley* 6375!.—DISTRIB. Burma? (*Kurz*); Sumatra, Bangka (*Teysmann*), Java. Vern. 'Garu.'

2. *AQUILARIA HIRTA*, *Ridley* in Journ. R. As. Soc. Straits Br. xxxv. 73 (1901). A small tree reaching 30 ft. in height; branchlets pale brown, rough, uppermost tomentose; leaf-buds lanceolate, white-silky. *Leaves* subcoriaceous; elliptic or elliptic-ovate, acuminate and mucronate at apex, obtusely acute or rounded at base; both surfaces olivaceous when dry, the lower paler, upper glabrous, lower puberulous especially when young; margin recurved and thickened; 8—18 cm. long, 3—6 cm. broad; midrib rather stout, usually impressed above, tomentose beneath; main nerves numerous, 20—30 pairs, irregular, sometimes branched, nearly straight to the thickened margin and with secondary nerves between, also many very fine subparallel horizontal nervules; petiole thickened, 5—7 mm. long, curved. *Umbellules* on axillary branchlets or subterminal, 8—10-flowered, densely grey-tomentose; peduncles short, slender, 5—10 mm. long; pedicels slender, 5—6 mm. long; buds clavate, 1 cm. long at time of opening. *Perianth*-tube cylindric, 8—10 mm. long, densely tomentose without, ribbed and sparsely villous within; lobes ovate, 4 mm. long, villous on both surfaces, erect in flower and fruit; scales 10, very small, ovate, densely pilose. *Stamens* below the scales, the anthers twice as long as them. *Ovary* clavate, densely villous; style short, slender; stigma conical-capitate, bifid. *Capsule* densely-olive-grey tomentose without, oblanceolate, somewhat acute at apex, much narrowed at base and supported by the persistent somewhat enlarged perianth, 4 cm. long, 1—1.5 cm. broad; pericarp leathery. *Seeds* ovoid, glabrous, beaked, 1 cm. long, the basal appendage half as long again; testa crustaceous, black, shining.

JOHORE: at Bukit Pengaram, *Ridley* 11020!, *Murton* 2!. SINGAPORE: at Bajan, *Goodenough* 3837!. Vern. 'Chandan.'



## Family CV bis GONYSTYLACEÆ.

Trees. *Leaves* alternate, evergreen, penni-nerved. *Flowers* hermaphrodite, in short racemes or umbels in axillary or terminal panicles; buds globose. *Perianth* short, cupshaped, 5-cleft, thickly coriaceous, hirsute within, with a ring of elongated setaceous curved scales at the base within. *Stamens* many at the base of the perianth; filaments short; anthers basifixed, elongate, 2-celled, the cells rounded over the top. *Ovary* 4—6-celled; ovules solitary in each cell, pendulous, anatropous; style filiform, geniculate-flexuose; stigma clavate. *Fruit* a subglobose, irregularly loculicidally dehiscent capsule; pericarp very thick. *Seeds* usually 1—2 only, globose or oblong, pendulous; testa crustaceous, tegmen membranous; albumen 0; cotyledons large, fleshy, plano-convex; radicle minute, superior.—DISTRIB. One genus.

This Family was described by Gilg in Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 231 (1897) to receive the genus *Gonystylus* which had been placed in *Thymelaeaceæ* by previous authors. It comes, according to Gilg, just before *Tiliaceæ* but is *Monochlamydeous*.

## 1. GONYSTYLUS, Tevsm. and Binn.

Characters of the Family.—DISTRIB. Malay Peninsula and Archipelago, 7 species.

GONYSTYLUS MAINGAYI, Hook. f. in Fl. Br. Ind. V. 200 (1886). A large tree reaching 18 to 24 m. in height and 45 to 60 cm. in diam. of stem; branches woody with black smooth bark wrinkled when dry; branchlets moderately thick, young ones and inflorescence finely grey-pubescent. *Leaves* chartaceous; elliptic-oblong or oblong-lanceolate, somewhat abruptly obtusely cuspidate-acuminate and mucronate at apex, rounded or cuneate at base; both surfaces shining, olive-brown when dry, upper glabrous, lower black-glandular, glabrous or slightly puberulous especially on the midrib; margin thickened; 10—20 cm. long, 4—7 cm. broad; midrib stout, prominent beneath, slightly impressed above; main nerves about 20 pairs, starting at about 70° with the midrib and curved to join in an arched intramarginal nerve; secondary nerves many, parallel, branched to join the main nerves in a raised reticulation; petiole stout, rugose, puberulous, 1—2 cm. long. *Panicles* terminal, densely and finely grey-pubescent, 8—12 cm. long; branches short, about 1 cm. long; racemes subumbellate, 3—6-flowered; pedicels straight, 1—2 cm.

long; buds globose, about 5 mm. in diam. *Perianth* thick, densely villous with stiff hairs within; lobes 5, unequal; scales subulate, often bifid, black when dry, 2—3 mm. long, about 15 to 20 in number in a ring a little above the bases of the lobes. *Stamens* about as many as the scales and within them; filaments very slender, short; anthers 1 mm. long, oblong. *Ovary* densely villous without, usually 4-celled in a cross; style very long, twisted; ovules flattened. *Capsule* large, globose, obovoid or ellipsoid-oblong, 4—6 cm. long, 2.5 to 4 cm. in diam.; pericarp very thick and woody, the 2—4 valves of transverse woody fibres, the surface rough, pitted. *Seeds* 1—4, usually 1 or 2, globose or oblong; testa crustaceous; cotyledons very fleshy, 2—3 cm. in diam. Gilg in Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 232; Ridl. in Journ. R. As. Soc. Straits Br. xxxv. 89 (1901).

PENANG: Government Hill, *Curtis* 1509!, 3036!; at Balik Pulau, *Ridley* 9399!. PERAK: at Tapa, *Wray* 1252!; at Goping, *Scortechini* 1957!; near Larut, *King's Collector* 3703!, 3778!, 6925!, 7478!, 7592!, 7752!. MALACCA: *Maingay* K.D. 1441!. SINGAPORE: Garden jungle, *Ridley* 6186!; Bukit Mandai, *Ridley* 6719!; at Chua Chu Kang, *Ridley* 6719a!.

The great mass of available material shows considerable variation, to some extent in the leaves, but especially in the size of the fruit. But I have tried in vain to arrange it in varieties and must come to the same conclusion as *Ridley* did. In his 'Notes on the Flora of Singapore' in the Journal of the Straits Br. R. As. Soc. he has pointed out that 'the fruit in Herbarium specimens often splits before it is ripe.' He clearly considers that the Peninsular material, of which the Singapore Herbarium has a great series of specimens, all belongs to one species, and I have thought it right to follow him and describe it accordingly. The type is *Maingay's* 1441, the leaves of which are more reddish-brown and slightly more pubescent beneath than most of the other material, but I can find no other difference.

#### Family CVI. ELÆAGNACEÆ.

Trees or shrubs with copious silvery or brown scales. *Leaves* alternate or opposite, quite entire, exstipulate. *Flowers* small, regular, hermaphrodite or dioecious, in axillary fascicles, spikes or racemes; bracts small, deciduous. *Perianth* in hermaphrodite or ♀ flowers tubular, constricted above the ovary, persistent below, deciduous above, limb 2—4-lobed; in ♂ sometimes of 2 membranous lobes. *Stamens* in hermaphrodite flowers adnate to the throat of the perianth-tube, as many as the lobes and alternate with them, in ♂ flowers

adnate to the base of the perianth and twice as many as the lobes; filaments free, short, anthers oblong, 2-celled, the cells parallel, dehiscent longitudinally. *Ovary* free, 1-celled; style filiform, stigma lateral; ovule 1, basal, erect, anatropous. *Fruit* a nut, closely covered by the thickened perianth base; pericarp membranous. *Seed* erect; testa crustaceous or hardened; albumen scanty or 0; cotyledons thick, fleshy; radicle inferior.—**DISTRIB.** North temperate and tropical regions: genera 3, species about 16.

### 1. *ELÆAGNUS*, Linn.

Trees or shrubs, with silvery or stellate scales. *Flowers* hermaphrodite, axillary, solitary or in fascicles or racemes. *Perianth*-tube campanulate or funnel-shaped, narrowed above the ovary; lobes 4, valvate, deciduous. *Stamens* 4, on the mouth of the perianth on a prominent ring, alternate with the lobes. *Ovary* 1-celled, style linear, stigma lateral. *Fruit* a nut, closely covered with the thickened perianth-base.—**DISTRIB.** S. Europe, temperate and tropical Asia, Australia, N. America; species 12.

*ELÆAGNUS LATIFOLIA*, Linn. Sp. Pl. 121 (1753). A large climbing shrub, with thick stem; branches stout, spinescent; branchlets rough, covered, like the leaves beneath and inflorescence, with rust-coloured, shining, like the leaves beneath and inflorescence, with rust-coloured, shining, peltate scales. *Leaves* variable, membranous to coriaceous; elliptic or elliptic-lanceolate, obtuse, acute or acuminate at apex, acute to almost rounded at base; upper surface pale green with scattered silvery scales when young, lower surface silvery, scaly when young, rusty brown when older; 5—10 cm. long, 3—5 cm. broad; midrib slender; main nerves 5—7 pairs, curving to near the margin and then joining in loops; reticulation rather obscure; petiole slender, 1—1.5 cm. long. *Flowers* ♂ or ♀, many, greenish or yellowish-white, in axillary fascicles or racemes up to 2 cm. long, the rachis lengthening and rugose with the scars of fallen flowers and bracts; bracts boat-shaped, curved, caducous, 1—2 mm. long; pedicels short. *Perianth*-tube campanulate, 5—10 mm. long; lobes ovate, acute, 2—3 mm. long, spreading; anthers oblong, 1 mm. long; style hirsute towards the base. *Fruit* ellipsoid-oblong, 1—2 or more cm. long, crowned with the top of the perianth, orange or red with white spots, densely scaly, prominently 8-ribbed when dry; mesocarp succulent, edible; endocarp densely felted. *Seed* oblong; testa shining; cotyledons thick, fleshy; radicle pointed, small. Schlecht. in DC. Prodr. xiv. 610; Wight Ic. t. 1856; Wall. Cat. 4028; Bl. Bijdr. 637;

Brandis For. Fl. 390, t. 46 and Ind. Trees 547; Bedd. Fl. Sylv. Man. t. xxv, fig. 1; Trimen Fl. Ceyl. III. 461; Prain Beng. Pl. 908; Cooke Fl. Bomb. II. 543; Hook. f. Fl. Br. Ind. V. 202; Koord. Exkurs. Fl. Jav. II. 658. *E. conferta*, Roxb. Fl. Ind. I. 440 and Ed. Carey and Wall. I. 460; Kurz For. Fl. II. 331; Schlecht. in DC. l.c. 612. *E. arborea*, Roxb. ll.c. 441 and 461; Schlecht. l.c. 611; Wall. Cat. 4027. *E. ferruginea*, A. Rich. Monog. Elæagn. 387, 404; Schlecht. l.c. 610; Miq. Fl. Ind. Bat. I. 1. 980; Wall. Cat. 4029. *E. Thwaitesii* and *Wallichiana*, Schlecht. l.c. 611, 612. *E. Kologa*, Schlecht. l.c. 611; Dalz. and Gibs. Bomb. Fl. 224.

PENANG: *Maingay* K.D. 1312!; at Government Hill, 750 m., *Curtis* 904!; *Ridley*!; *King's Collector* 5214!.—DISTRIB. India, Ceylon, Malay Archipelago, China.

Ridley says that the plant is only introduced and run wild in Penang, but in view of its wide distribution in India and the Archipelago, it seems best to describe it here.

#### Family CVIII. SANTALACEÆ.

Trees, shrubs or herbs, many being parasitic or semi-parasitic on the branches or roots of other plants. *Leaves* alternate or opposite, entire, sometimes scale-like or 0, exstipulate. *Inflorescence* various; flowers inconspicuous, usually bracteate and bracteolate, regular, 1—2-sexual. *Perianth* superior or partly inferior, 3—8-lobed—toothed or -partite. *Stamens* as many as and opposite to the perianth lobes, attached to or above the perianth-base; anthers 2-celled. *Disk* epigynous or perigynous. *Ovary* 1-celled, inferior; ovules 2—3, adnate to or pendulous from a central column; style short; stigma entire or 3—6-lobed. *Fruit* a nut or drupe. *Seed* globose or ovoid, rugose or sulcate; testa thin or wanting; albumen copious, fleshy; embryo usually terete; radicle superior.—DISTRIB. About 240 species, in temperate and tropical regions; genera about 23.

Erect or climbing, usually parasitic shrubs; flowers

minute, in short racemes; drupe small .. .. 1. HENSLOWIA.

Trees, often spiny; flowers in short catkin-like spikes;

drupe large .. .. 2. SCLEROPYRUM.

Genus to be transferred to Opiliaceæ—CHAMPEREIA.

#### 1. HENSLOWIA, Blume.

Parasitic shrubs with spreading, erect or twining branches. *Leaves* alternate, petiolate, thickish. *Flowers* very minute, monœ-

cious or dicecious, the ♂ in fascicles of cymes or capitula from the axils of the leaves, the ♀ or ♂ solitary or in small clusters. *Perianth*-tube of ♂ 0, of ♀ adnate to the ovary, globose, ovoid or oblong; lobes 5—6, valvate. *Stamens* 5—6, inserted at the base or middle of the lobes and opposite to them, in ♀ none or reduced to staminodes, in ♂ as in ♀; filaments short, thick; anthers introrse, didymous, dehiscing by a transverse slit. *Disk* concave or convex, epigynous. *Ovary* inferior, 1-celled; ovules 2—4, suspended from the apex of a free central placenta; stigma subsessile, discoid or lobed. *Drupe* ovoid, obovoid or subglobose; exocarp fleshy; endocarp hard, often bony, protruded within in 5—10 vertical sinuous hard plates into fissures in the stellately-lobed seed. *Seed* with long funicle and much-lobed albumen; embryo central; cotyledons linear or oblong, usually shorter than the superior radicle.—*DISTRIB.* About 20 or more species, Indian, Malayan and Chinese.

- Drupe* large, reaching 13 mm. long, 9 mm. broad;  
leaves coriaceous, broadly obovate or orbicular,  
pedately 5-ribbed; racemes up to 2 cm. long .. 1. *H. RIDLEYI*.
- Drupe* medium-sized, 8—10 mm. long, 6—8 mm. broad.  
Leaves subcoriaceous, elliptic or obovate, 3- or  
pedately 5-ribbed; racemes up to 7—12 mm. long;  
drupe 5-furrowed .. .. 2. *H. VARIANS*.
- Leaves coriaceous, elliptic, obovate or oblanceolate,  
sometimes orbicular, 3-ribbed; racemes 5—7 mm.  
long; drupe smooth .. .. 3. *H. WRAYI*.
- Leaves coriaceous, ovate, obtuse at apex, 9-ribbed;  
racemes 20 mm. long; drupe obscurely furrowed .. 4. *H. PLUMINERVIS* ?
- Drupe* small.
- Drupe* globose, 5 mm. in diam., obscurely 5-fur-  
rowed; leaves coriaceous, obovate to orbicular, 3-  
or pedately 5-ribbed; racemes 6 mm. long .. 5. *H. LOBBIANA*.
- Drupe* globose, 3 mm. in diam.  
Drupe 4—6-furrowed; leaves subcoriaceous, el-  
liptic or obovate, usually small, 3—5—7-ribbed  
but not channelled; flowers from a tubercle,  
nearly sessile .. .. 6. *H. BUXIFOLIA*.
- Drupe* obscurely furrowed; leaves coriaceous,  
obovate, obtuse and emarginate, 3- or pedately  
5-ribbed, the ribs in channels; flowers in fascicles  
of short racemes .. .. 7. *H. MONTICOLA*.

1. *HENSLOWIA RIDLEYI*, Gamble in Kew Bull. 201 (1912). A climbing parasitic (?) shrub; branchlets stout, nearly black when dry. *Leaves* coriaceous; broadly obovate or orbicular, rounded and sometimes slightly emarginate at apex, abruptly narrowed at base into

the petiole; both surfaces glabrous, the upper shining, the lower ferruginous-brown, sometimes puncticulate; margin slightly recurved; 2—5.5 cm. in diam.; ribs primarily 3, the 2 outer pedately branching early to make 5, curved to join in faint loops at the apex; main nerves none, transverse nervules and reticulation irregular, obscure; petiole 1—2 cm. long, rather slender below, above gradually broadened to the blade. *Flowers* rather large (for the genus) in slender few-flowered racemes up to 2 cm. long, fascicled in the axils of the leaves; bracts small, deciduous. *Perianth* tube in ♂ very short, lobes 5—6, triangular, 1.5 mm. long: in ♀ enclosing the ovary, lobes rather shorter than in ♂, persistent. *Disk* concave, ♂ apiculate only in the centre, ♀ with the lobed stigma. *Drupe* rather large, obovoid, about 13 mm. long, 9 mm. broad, exocarp furrowed, slightly rugose and with many irregular protuberances into the albumen within.

SELANGOR: Sempang mines, *Ridley* 15563!. PAHANG: at Kluang Terbang, *Barnes*!; at Gunong Tahan, 1500—1800 m. alt., *Wray and Robinson* 5484?!

2. *HENSLOWIA VARIANS*, Blume Mus. Bot. Lugd.-Bat. I. 244. t. xliii (1850). A climbing parasitic shrub reaching 4—6 m. in length; branches terete, nearly smooth, nodose and somewhat angular. *Leaves* subcoriaceous; elliptic or obovate, obtuse or rounded at apex, narrowed at base; both surfaces glabrous, the upper shining, the lower sometimes puncticulate, olive-green when dry; margins reflexed; 4—9 cm. long, 2—6 cm. broad; ribs usually 3, sometimes 5 by the bifurcation of the outer ones, sometimes with a pair of inconspicuous ones near the margin, all curving to anastomose near the apex; nerves very few, irregular and irregularly netted; petiole 3—10 mm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* minute; ♂ in fascicles of racemes 7—12 mm. long in the axils of the leaves, bracts minute, caducous, buds depressed, concave at top; pedicels short, 1—2 mm. long; ♀ also fascicled but the racemes fewer. *Perianth*-tube very short in ♂, the lobes triangular, 1—1.5 mm. long, minutely recurved-apiculate; in ♀ surrounding the ovary, the lobes persistent in fruit. *Disk* in ♂ flat or slightly concave, 2.5 mm. in diam.; in ♀ surrounding the 5-lobed stigma. *Drupe* ellipsoid-globose, 8—10 mm. long, 6—7 mm. broad, rugose, the endocarp 5-furrowed; cotyledons usually shorter than the radicle. A. DC. Prodr. xiv. 631; Hook. f. Fl. Br. Ind. V. 233; Brandis Ind. Trees 554. *Dendrotrophe varians*, Miq. Fl. Ind. Bat. I. 1. 780.



TRANG: *Kunstler* (*King's Collector*) 1386!. KEDAH: at Coah, *Curtis* 2593!. PENANG: on Penang Hill, *G. King*!. PROVINCE WELLESLEY: at Tasik Glugur, *Ridley*!. DINDINGS: at Lumut, *Ridley*!; *Scortechini*!. PERAK: Larut at 240—300 m. alt., *King's Collector* 5213!. MALACCA: *Maingay* K.D. 1316/2!; at Bukit Bruang, *Ridley* 322!; at Pringgit, *Goodenough* 1675!; *Hullett* 640!. JOHORE: at Tanjong Kupang, *Ridley*!. SINGAPORE: at Chenchukang, *Goodenough*!; at Changi, *Ridley*!.—DISTRIB. Tenasserim (*Griffith* K.D. 4390!, 4392!), Borneo.

3. *HENSLOWIA WRAYI*, *King* M.S. in *Herb. Calc.*; *Gamble* in *Kew Bull.* 201 (1912). A climbing parasitic shrub reaching a considerable length (12—18 m., *Kunstler*); branchlets terete, slender, the older somewhat rough. *Leaves* coriaceous; elliptic, obovate or oblanceolate sometimes orbicular, obtusely acute or rounded at apex, acute or acuminate at base; both surfaces glabrous, dull, olivaceous when dry; margins recurved; 4—8 cm. long, 2—5 cm. broad; ribs 3, prominent, sometimes branched but rarely; nerves few, short, inconspicuous, chiefly outside the outer ribs; reticulation obscure; petiole rather thick, about 5 mm. long, gradually expanding into the blade. *Flowers* in short fascicles of racemes from the axils of the leaves or the scars of fallen leaves; ♂ slender, 3—4-flowered, 5—7 mm. long, with small ovate bracts on the rachis and below the flowers; ♀ racemes thicker, fewer-flowered; pedicels scarcely 1 mm. long. *Perianth-tube* in ♂ very short, lobes triangular, 5—1 mm. long, apex hooked; in ♀ enclosing the ovary, lobes as in ♂. *Disk* concave, 1 mm. broad; in ♂ with a minute apiculus, in ♀ with a 5-lobed stigma. *Drupe* ellipsoid-obovoid, 1 cm. long, 7.5 mm. broad; smooth, not ribbed, endocarp rugose; albumen much lobed.

PERAK: hilly country at 150—300 m., *King's Collector* 4214!, 10834! (type); at Sungie Larut and Relan Tujur, *Wray* 2279!, 4032!. MALACCA: *Goodenough* 1937!; *Hervey*!.

4. *HENSLOWIA PLURINERVIS*, *Boerl. Handl. Fl. Ned. Ind.* III. 181 (1900)? A climbing shrub; branchlets rounded, rather rough, nearly black when dry. *Leaves* coriaceous; ovate, obtuse at apex, narrowed at base into the broad petiole; both surfaces glabrous, upper somewhat shining, lower dull; margins recurved; 4—7 cm. long, 3—5 cm. broad; ribs about 9, usually starting from the base, but occasionally branched; main nerves none, transverse nervules and reticulation very obscure; petiole stout, broad, 5—10 mm. long,

gradually broadening into the blade. *Flowers* hermaphrodite (?) in racemes up to 2 cm. long, fascicled 2 to 3 together in the axils of the leaves. *Perianth*-tube enclosing the ovary; lobes 5, triangular, 1 mm. long, persistent in fruit. *Disk* slightly concave, 5-angled, with the 5-lobed stigma in the centre. *Drupe* suborbicular, 8 mm. long, 7 mm. broad, exocarp fleshy, the endocarp rugose, obscurely channelled, with many protuberances into the albumen within. *Dendrotrophe plurinervis*, Miq. Fl. Ind. Bat. I. 1. 1096?

PERAK: at Gunong Batu Pateh, 1300—1400 m. alt., Wray 2781.  
—DISTRIB. Sumatra, *Teysmann*.

The description herein given is taken from Wray's specimens and the suggested identification was first made after reading Miquel's description of his *D. plurinervis* in the Fl. Ind. Bat. By the courtesy of the authorities at Kew, I was enabled to examine the type specimen, lent from the Herbarium at Utrecht, and the examination only confirms my doubt. The type specimen is poor indeed, consisting now of only slender branchlets and a few leaves in poor condition, the branchlets, which bear the appearance of having had suckers, are smoother and the leaves are rather thinner and more nearly orbicular than in Wray's specimen, but the agreement seems sufficiently close to make it undesirable at present to consider Wray's plant as a new species.

5. *HENSLOWIA LOBBIANA*, A. DC. Prodr. xiv. 631 (1857). A climbing parasitic shrub reaching 4—5 m. in length; branches usually rough, but often nearly smooth, sometimes striate, dark brown when dry, uppermost angular, nodose. *Leaves* coriaceous; broadly obovate to orbicular, rounded at apex, attenuate and almost cuneate at base; both surfaces glabrous, the upper shining, the lower dull and sometimes puncticulate, usually dark brown when dry; margins reflexed; 2.5—6 cm. long, 2—4 cm. broad; ribs usually 3, the outer pair sometimes bifurcated; nerves very few, irregular and chiefly between the outer ribs and the margin; petiole broad, 4—6 mm. long, bordered by the decurrent margins of the blade. *Flowers* minute; ♂ in fascicles of racemes up to 6 mm. long in the axils of the leaves, bracts minute, caducous, buds clavate, convex at top, pedicels scarcely 1 mm. long; ♀ also in fascicled racemes but of few flowers, the floral bracts obovate, 2 mm. long; pedicels very short. *Perianth* tube in ♂ very short, in ♀ enclosing the ovary, the lobes persistent in fruit. *Disk* in ♂ flat or concave; in ♀ annular, thick, surrounding the columnar 5-lobed stigma. *Stamens* with the connective of the anthers produced in a rounded apiculus. *Drupe* globose, 5 mm. in diam., obscurely 5-furrowed and rugose; cotyledons

oblong, nearly as long as the radicle. Hook. f. Fl. Br. Ind. V. 233; Merr. in Philipp. Journ. Sc. I. Suppl. 50.

PENANG: *Lobb* 334!; Government Hill, *Mainyay* K.D. 1315!; *Curtis* 1393, etc.!; *Ridley*!. PAHANG: at Praman and Katapang, *Ridley* 1239!. MALACCA: *Griffith*; *Mainyay* K.D. 1313!. SINGAPORE: at Changi, *Ridley* 4697!, 4728!, 5909!; *Kunstler* (*King's Collector*) 1181!.—DISTRIB. Borneo (*Haviland* 84!), Philippine Islands.

6. *HENSLOWIA BUXIFOLIA*, Blume Mus. Bot. Lugd.-Bat. I. 224 (1850). A slender climbing parasitic shrub reaching 5–10 m. in length, sometimes trailing on the ground; the branches terete, wiry, dark brown. *Leaves* yellowish-green, subcoriaceous; elliptic or obovate, obtuse or obtusely acute at apex, narrowed at base, young ones often spathulate; glabrous on both surfaces and dull, the upper sometimes shining; 1–6 cm. long, 0.5–2 cm. broad: ribs 3, or 5 or 7 by the subdivision of the outer pair, the inner 3 only reaching to and joining at the apex; nerves rarely 1–2; reticulation obscure; petiole broad, 3–6 mm. long, bordered by the decurrent margins of the blade. *Flowers* minute, sessile, or very minutely pedicelled on the top of a peduncle scarcely 5 mm. long; ♂ very scarce, without bracts, ♀ bracteate at base; all from very short tubercles on the branchlets. *Perianth*-tube very short in ♂, the lobes triangular, under 1 mm. long, hooked at the apex; in ♀ surrounding the ovary, the lobes persistent in fruit. *Disk* in ♂ flat, 5-lobed; in ♀ concave with a minute 5-lobed stigma. *Drupe* dark red or purplish-black, globose, rugose, 3 mm. in diam.; endocarp 4–6-furrowed. A. DC. Prodr. xiv. 631; Hook. f. Fl. Br. Ind. V. 234. *Dendrotrophe buxifolia*, Miq. Fl. Ind. Bat. I. 1. 781. *Osyris rotundata*, Griff. Notul. N. 742 and Ic. Pl. Asiat. t. 627, f. 2.

KEDAH: at Kedah Peak, *Ridley*!. PENANG: at Polo Inajah, *Curtis* 477!. PERAK: at Larut, under 100 m. alt., *King's Collector* 4179!. TRINGGANU: at Bundi, *Ridley*!. PAHANG: at Kluang Terbang, *Barnes* 10908!; at Praman Pekan, *Ridley* 3!, 89!. MALACCA: in littoral woods, Tanjong Cling, *Griffith* K.D. 4391!; *Cuming* 2366; at Gunong Mering, *Ridley* 3159!. JOHORE: at Tanah Runto, *Good-enough* 3381!; top of Bukit Pengaram, *Ridley* 11032!. SINGAPORE: at Kranji, Bajan, etc., *Ridley*!.—DISTRIB. Bangka (*Teysmann*) Borneo.

7. *HENSLOWIA MONTICOLA*, Gamble in Kew Bull. 201 (1912). A parasitic shrub; branchlets smooth, angular, striate, nearly black.

*Leaves* coriaceous; obovate-spathulate, very obtuse and emarginate at apex, acuminate at base; both surfaces dull, glabrous, nearly black when dry; margins recurved; 2—3 cm. long, 1.5—2.5 cm. broad; ribs 3, the two outer forked pedately to make 5 in all, curved to join in loops at the very apex, the 5 lying in channels and themselves raised on the upper surface; main nerves few, short; transverse nervules and reticulation irregular, raised on the upper surface; petiole rather slender, about 5 mm. long, gradually broadening into the blade. *Flowers* hermaphrodite, in very short axillary or lateral fascicles of racemes, the racemes very few-flowered, 3—5 mm. long, bracts 0, or quickly deciduous. *Perianth*-tube enclosing the ovary; lobes triangular, acute, .5—1 mm. long, persistent in fruit. *Disk* concave, 1—2 mm. broad, with 5-lobed stigma in the centre. *Drupe* blue-black, globose, 2 mm. in diam., obscurely furrowed; exocarp fleshy, endocarp rugose with many interior plates: albumen much branched; cotyledons much shorter than the radicle.

PERAK: camp on Ulu Batang Padang, 1500 m. alt., Wray 1536!

I am still unable to identify *Maingay* K.D. 1314 from Malacca: see Hook. f. Fl. Br. Ind. V. 234. It seems to come nearest to *H. Wrayi* or *H. plurinervis*?

## 2. SCLEROPYRUM, Arnott.

Trees with axillary spines. *Leaves* alternate, coriaceous, pinninerved. *Flowers* polygamous, in short catkin-like spikes at the leafless nodes. *Perianth*-tube of male flowers solid, of female or hermaphrodite flowers adnate to the ovary; lobes 4—5, valvate or subimbricate. *Stamens* 4—5, opposite the perianth-lobes, filaments bifid, the anther-cells on separate branches, transversely dehiscing. *Disk* annular, undulate on the margin. *Ovary* inferior; ovules 3, pendulous from the top of a central column; style short; stigma large, peltate. *Fruit* a pyriform drupe on a thickened pedicel, crowned by the remains of the perianth-lobes; exocarp thick, fleshy, endocarp hard. *Seed* 1, globose; albumen copious; embryo terete, central, surrounded by the albumen; cotyledons oblong; radicle superior.—DISTRIB. Species 2—3, in India and Malaya.

*Leaves* glabrous; drupe subglobose, pyriform, 2—3

cm. in diam. . . . . 1. S. MAINGAYI.

*Leaves* softly tomentose beneath; drupe pyriform, 1—

1.5 cm. in diam. . . . . 2. S. RIDLEYI.

1. *SCLEROPYRUM MAINGAYI*, Hook. f. in Fl. Br. Ind. V. 235 (1886). A medium-sized tree reaching 12—15 m. in height, the stem armed with stout spines (Curtis); branchlets smooth, pale brown. *Leaves* ovate or ovate-oblong, obtuse or acuminate at apex, acute or rounded, usually unequally, at base; both surfaces glabrous, olive-brown when dry; 15—30 cm. long, 8—13 cm. broad; midrib strong, impressed above; main nerves 4—5 pairs, prominent, irregular, keeled above, curving to anastomose in loops near the margin, joined by irregular widely-netted nervules; petiole stout, 1—1.5 cm. long. *Spikes* of ♂ flowers about 5 cm. long, the rhachis pubescent; bracts ovate acuminate .5—1 mm. long recurved; perianth-tube thick, lobes 2 mm. long, acuminate, glabrous within; of ♀ flowers elongated, much enlarged in fruit and then reaching 20 cm. or more. *Stamens* short, filaments thick, glabrous, anther-cells rather large. *Disk* 5-lobed. *Ovary* pubescent; style thick; stigma capitate, lobed. *Drupe* subglobose, pyriform, the peduncle contracted, the globose portion 2—3 cm. in diam.; exocarp fleshy, glabrous, endocarp bony, deeply ribbed. *Seed* globose, conform to the endocarp; albumen fleshy. Koord. & Val. Bijdr. V. 375; Koord. Exkurs. Fl. Jav. II. 169.

PENANG: at Puntie Achie, *Curtis* 3082!. PAHANG: at Sungei Tahan, *Ridley* 2651!. MALACCA: *Maingay* K.D. 1438!; at Marlimo, *Alwis* 2156!.

2. *SCLEROPYRUM RIDLEYI*, Gamble in Kew Bull. 202 (1912). A small tree, the trunk armed with sharp thick straight thorns 1—2.5 cm. long; branchlets thick, also spinous, the uppermost softly ferruginous-tomentose, as are the innovations, the inflorescence and the under surfaces of all but old leaves. *Leaves* submembranous, variable in shape; ovate obovate or oblong-lanceolate, acute or acuminate sometimes abruptly at apex, acute or rounded and often unequal at base; both surfaces pale when dry, the upper somewhat bullate; 10—25 cm. long, 5—10 cm. broad; midrib prominent, impressed above; main nerves 6—10, irregular, prominent beneath, curving to anastomose near the margin, joined by prominent irregular transverse nervules and reticulation; petiole 3—10 mm. long, channelled above. *Spikes* of ♂ flowers densely rufous-pubescent, 7—8 cm. long, the rhachis thick, the perianth-tube thick, 5 mm. long; of ♀ flowers 15—25 cm. long, the rhachis densely pubescent; perianth-tube cylindric, rufous-tomentose, 2—3 mm. long; perianth-lobes ovate, reflexed, 2—3 mm. long. *Stamens* very short, filaments thick,

anther-cells very small. *Disk* 5-lobed. *Ovary* pubescent; style thick; stigma capitate, lobed, the lobes reflexed. *Drupe* pyriform, 3—4 cm. long, the upper part 10—15 mm. in diam.; exocarp glabrous or nearly so, endocarp bony, rugose; fruiting rhachis thickened. *Seed* 1 cm. in diam., cotyledons thin, oblong.

SINGAPORE: at Selitar, Bukit Mandai, Changi, Bajan, Chanchukang, etc., *Ridley* 1921!, 4761!, 5889!, etc.; at Changi, *Hullett* 850!.

#### CHAMPEREIA, Griff.

Glabrous shrubs or small trees. *Leaves* alternate, shortly petiolate. *Flowers* minute, in 3—5-flowered axillary paniced cymes, hermaphrodite or sometimes ♂ by abortion; bracts minute or 0. *Perianth* inferior; segments 5, valvate. *Stamens* 5, perigynous, opposite the perianth-lobes; filaments filiform; anther-cells parallel, dehiscing longitudinally. *Disk* hypogynous, annular, often lobed. *Ovary* superior, half immersed in the disk; stigma broad, sessile; ovule solitary, erect. *Drupe* ellipsoid, pedicelled; exocarp thin, endocarp crustaceous. *Seed* conform to the drupe; embryo inverted in the middle of fleshy albumen; cotyledons 2—4, linear; radicle superior, clavate.—DISTRIB. About 2—3 species, of the Malay Peninsula and Archipelago.

In the *Naturl. Pflanzenfam.* Engler and Prantl have transferred this genus to OPILACEÆ and have been followed by Merrill. This seems to be right, but I describe it here as it was omitted from the description of OLACINÆ (including OPILACEÆ) in *Journ. As. Soc. Beng.* LXIV. II. 1 (1895). 94.

CHAMPEREIA GRIFFITHIANA, Planch. in *Herb. Hook.* A shrub or small tree reaching 4—5 m. in height; branchlets slender, pale brown, smooth. *Leaves* subcoriaceous; ovate-oblong or lanceolate, acute to long acuminate at apex, acute at base; both surfaces glabrous, pale when dry and punctulate; 7—15 cm. long, 3—6 cm. broad; midrib slender, prominent; main nerves about 5—6 pairs, distant, arched, joined by irregular reticulation; petiole 5—7 mm. long. *Male panicles* slender, 5—10 cm. long; pedicels filiform, 2—7 mm. long; fruiting panicles much longer and stouter, the pedicels enlarged; perianth-lobes reflexed in ♂, erect in ♀ flowers. *Drupe* 10—15 mm. long, 10 mm. in diam., yellow to bright red when ripe; pericarp smooth, the apex rounded. *Hook. f. Fl. Br. Ind.* V. 236; *Kurz in Journ. As. Soc. Beng.* xliv. II. 154 and in *For. Fl.* II. 330 (*Griffithii*). *Champereia* Griff. in *Calc. Journ. Nat. Hist.* IV. 237.

PENANG: Government Hill, *Maingay* K.D. 375!; *Curtis* 155!;



Sulloh Bahang, *Curtis* 1163!; Batu Ferengy, *Curtis* 1716!, 2262!; *King's Collector* 1291!. PERAK: near Ulu Kerling, *King's Collector* 8550!, 8715!; upper Perak at 90 m. alt., *Wray* 3485!. DINDINGS: at Lumut, *Ridley* 8021!, 10267!. SELANGOR: Klang gates, *Ridley* 13456!. PAHANG: at Pekan, *Ridley* 1097!. MALACCA: *Griffith* K.D. 4388!; *Ridley*!; *Derry* 25!, 462!. JOHORE: Bukit Sialu, etc., *Ridley* 4696!; *Lake and Kelsall*. SINGAPORE: Changi, Chanchukang, *Ridley*!.—DISTRIB. Burma, Andaman Islands, Sumatra.

Merrill in *Philipp. Journ. of. Sc. I. Suppl.* 50 (1906) follows Vidal in identifying this with *C. Cumingiana* = *Opilia Cumingiana*, Baill. *Adansonia* III. 124 (1862), but an examination of the Philippine specimens in the Kew and Calcutta Herbaria leaves me somewhat in doubt about this, and so I prefer not to follow him in changing the name.

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*Materials for a Flora of the Malayan Peninsula*, No. 24.—By J.  
SYKES GAMBLE, C.I.E., M.A., F.R.S., late of the  
*Indian Forest Department.*

This Part contains the Families Nos. 96 Nepenthaceæ, 98 Piperaceæ, 104 Proteaceæ and 107 Loranthaceæ. The account of the Family of the Nepenthaceæ has most kindly been contributed by Prof. J. M. Macfarlane, Director of the Botanic Garden at the University of Philadelphia, U. S. America, author of the Monograph of the Family in Engler's *Pflanzenreich*. The account of the large Family of the Piperaceæ is due to the kindness of Monsieur C. de Candolle of Geneva. The other two Families are my own work.

The new species in the Piperaceæ, 54 in number, were published as Part No 1 in Vol. VI of the Records of the Botanical Survey of India. Three new species in Proteaceæ, by Lieut.-Col. Sir D. Prain, C.M.G., C.I.E., F.R.S., Director of the Royal Gardens, Kew, and two by myself have been published in the Kew Bulletin, as well as 6 new species in Loranthaceæ. The total number of new species is thus 65.

Family XCVI. NEPENTHACEÆ.

By J. M. MACFARLANE.

Suffrutescent or frutescent, climbing, rarely erect or prostrate plants. *Stem* cylindric to trigonous. *Leaves* alternate, sessile or petiolate, often decurrent, divisible into basal lamina, excurrent tendriliform midrib, terminal inflated ascidiform midrib usually bearing ciliate laminar wings, also with orifice bounded by a corrugated peristome and lid at first closing but later arching over pitcher orifice; lamina and specially pitcher glandular, adapted for the attraction and catching of insects. *Inflorescence* a raceme of cymes condensing usually to a simple raceme, with small green, yellow or claret-coloured often ebracteate flowers. *Flowers* dioecious, regular, monochlamydeous. *Sepals* 4, rarely 3, in decussate pairs, glandular and nectariferous within, persistent. *Stamens* monadelphous, anthers rarely indefinite or 6—4, usually 12—8, aggregate into a globose mass. *Pistil* of 4, rarely 3, synarpous carpels; ovary oval to ovate, usually hairy, 4—3-celled with numerous minute ovules; style short or absent; stigma 4—3-lobed. *Fruit* a leathery or subwoody loculicidal capsule. *Seeds* small, albuminous, with membranous filiform

bicaudate testa and embryo in axis of albumen.—DISTRIB. Madagascar to Philippine Islands and N. Australia; one genus with about 65 species.

NEPENTHES, Linn.

*Characters as given above.*

Inflorescence a raceme of paniculate cymes; pitcher

lid small, reflexed .. .. 1. *N. ampullaria*.

Inflorescence a raceme, pedicels 3—1-flowered.

Longitudinal leaf-veins 2 to 4 pairs.

Leaves sessile, more or less amplexicaul, non-decurrent.

Leaf-veins 2 pairs, marginal, obscure, pitcher elongate with white tomentose collar below the corrugated, peristome ..

2. *N. albo-marginata*.

Leaf-veins 3 pairs, marginal, obscure, pitcher elongate with dull tomentose collar below the peristome ..

3. *N. gracillima*.

Leaf-veins 4 pairs, disposed between rib and margin, lid glabrous within; pedicels usually 1-flowered ..

4. *N. singalana*.

Leaf-veins 4, rarely 5, pairs, disposed between rib and margin, lid glabrous within; pedicels 3—2-flowered at least below ..

5. *N. sanguinea*.

Leaf-veins 4 pairs, lid with long rigid hairs within; pedicels biflorous, bracteolate ..

6. *N. Macfarlanei*.

Leaves sessile, decurrent, leaf-veins 2, rarely 3 pairs; pedicels biflorous below, uniflorous above ..

7. *N. Reinwardtiana*.

Longitudinal leaf-veins 5—6 pairs.

Leaves sessile, amplexicaul, decurrent; peristome uniform, narrow ..

8. *N. gracilis*.

Leaves petiolate; peristome of pitcher elongated posteriorly into a high neck ..

9. *N. Rafflesiana*.

Longitudinal leaf-veins 7—10 pairs.

Leaves petiolate, herbaceous, margin delicately ciliate-dentate ..

10. *N. phyllamphora*.

1. NEPENTHES AMPULLARIA, Jack in Comp. Bot. Mag. I. 271 (1835). A tall climbing shrub, sometimes with prostrate branches. *Stem* 12—20 m. high, cylindric, ferrugineo-tomentose when young, at length brown glabrous, internodes usually elongated. *Leaves* 10—35 cm. long, 4—9 cm. broad, petiolate, half-amplexicaul; petiole winged, gradually expanding into a lamina; lamina lanceolate to obovate, ferrugineo-tomentose when young at length glabrous, sparsely hairy beneath; longitudinal veins 4, rarely 3 pairs, parallel, united by oblique parallel nerves; leaves on prostrate branches often crowded

reduced, with clustered richly-coloured pitchers; tendril 5—8 cm. long, hirsute; pitchers usually small, 3—5 cm. long, 2—3 cm. broad, often larger on prostrate shoots, ventricose to subcylindric, green to purple-green, often blotched or marbled with claret; wings broad with doubly-ciliate margins; peristome transverse, narrow and recurved outwardly, wide and obliquely descending within, green, or purple-striped, lid narrow elliptic, reflexed, eglandular; pitcher within uniformly glandular, shining. *Inflorescence* 15—30 cm long; raceme of many dense 2—5-flowered ferrugineo-tomentose cymes. *Sepals* 4, external pair larger, yellow-green, glandular within. *Staminal column* shorter than sepals, glabrous, anthers 12—8. *Ovary* ovoid,  $\pm$  tetragonous, stigmatic lobes triangular. *Capsule* 2.5—3 cm. long, pubescent to subglabrous. *Seeds* 12—15 mm. long. Korthals Verh. Nat. Gesch. Bot. 39, t. 13; Hook. f. in Bot. Mag. t. 5109 and in DC. Prodr. XVII. 93; André in Ill. Hort. XXIV. 45, t. 272; Hook. f. Fl. Br. Ind. V. 69; Macfar. in Engl. Pfl.-reich IV. iii. 33, t. 13. *N. ampullacea*, Low Sarawak 69; Miq Fl. Ind. Bat. I. i. 1076.

PERAK: at Larut, *Kunstler* 4087!, 4148!, 6222!; at 100—300 ft. alt. *Wray* 600!, 1794; at Ipoh, *Curtis*!. MALACCA: at Padang Batu on Mt. Ophir and Ayer Punas, *Cuming*!; *Griffith*!. JOHORE: *Burbidge*; *Jensen*. SINGAPORE: *Jack*!; *Wallich* 2243!; *Maingay* K.D. 1322!; *T. Anderson* 161!, 163!, 164!, 166!. BINTANG: *Jack*!; *Wallich*!.—DISTRIB. Malaya to Sumatra, Borneo and N. Guinea.

2. *NEPENTHES ALBO-MARGINATA*, Lobb in Gard. Chron. (1849) 580. A slender climbing shrub. *Stem* 5—10 m. high, subcylindric to trigonous, densely white to grey stellate-pubescent when young, at length almost glabrous, internodes short below, elongating upwards. *Leaves* 10—30 cm. long, 1—4 cm. broad; broadly amplexicaul, scarcely decurrent, expanding from a subpetiolate base into an elliptic-lanceolate lamina, above and below stellate-pubescent, at length glabrous, margin ciliate, revolute in drying; longitudinal veins 2 pairs, obscure; transverse nerves few, reticulate; tendril short; pitcher 5—15 cm. long, 1.5—3 cm. broad, green and purple-striated or almost purple, subdimorphic; lower pitchers subventricose below, cylindric above, with expanded ciliate wings, upper tubular with shallow non-ciliate wings or ridges, peristome cylindric, uniform, sharply striate, purple-green to purple, bounded below externally by a grey or white tomentose collar; lid 1.5—2.5 cm., ovate to orbicular, richly glandular within; spur simple or 2—3-fid. *Inflorescence* 20—30 cm. long, racemose, loosely flowered, lower pedicels 2 upper

1-flowered. *Sepals* 4, elliptic, tomentose without, glandular within. *Staminal column* equal to sepals, tomentose, anthers 12—8. *Ovary* tomentose. *Capsule* 2.5—3 cm. long, valves attenuate, truncate at apex. *Seeds* 12 mm. long. Hook. f. in Trans. Linn. Soc. XXII. 422, t. 73; Masters in Gard. Chron. (1872) 542; Hook. f. in DC. Prod. XVII. 102 and Fl. Br. Ind. V. 70; Burbidge in Garden XVI, 542 ic. col; Macfar. in Engl. Pfl-reich IV. iii. 37. *N. tomentella* and *N. Teysmanniana*, Miq. Fl. Ind. Bat. I. i. 1073, 1075.

PENANG: *King's Collector* 1720!, 1723!, alt. 2000—2700 ft. at Penara Bukit, *Curtis' Collector*!, probably also *Wallich* 2244!; *Lobb*!; *Walker* 13!, alt. 2000 ft., *Hullett* 163!. PERAK: at Larut, *King's Collector* 2022!, alt. 800 ft. MALACCA: on Mount Ophir, *Lobb*!; *Hullett* 872!; *Whitehead*.—DISTRIB. Malaya to Sumatra and Borneo.

3. *NEPENTHES GRACILLIMA*, Ridley in Journ. Linn. Soc. XXXVIII 320 (1908). A slender climbing shrub. *Stem* trigonocylindric, glabrous. *Leaves* 5—10 cm long, 1—1.5 cm. broad; sessile, half amplexicaul, coriaceous, lanceolate, glabrous; longitudinal veins 3 pairs united by reticulate transverse nerves; tendril slender below thickened towards pitcher; pitchers 5—10 cm. long, 1—1.5 cm. broad, subcylindric, widest at middle, pale green with elongated purple areolae, wings narrow, sparsely ciliate above, reduced to shallow non-ciliate ridges below; peristome uniform, cylindric, oblique, elevated posteriorly, faintly striate, bounded below by a dull densely tomentose external collar; lid 1—1.5 cm., ovate, with large circular glands within; spur simple, recurved; pitcher within smooth glaucous purple above, glandular and shining over lower half. *Inflorescence* 12—20 cm. long; raceme shorter than peduncle, slender; pedicels 1-flowered, bracteolate. *Sepals* oval, densely tomentose without and along inner margin. *Staminal column* equal to sepals, pubescent below, glabrous above, anthers 8—6. Female flower unknown. *Capsule* 14—15 mm. long, fusiform, valves lanceolate, sparsely pubescent.

PAHANG: at Telom. *Ridley* 13704!; on Mt. Gunong Tahan about 3000 ft. alt., *Robinson and Wray* 5309!.

4. *NEPENTHES SINGALANA*, Beccari Malesia III 12. t. 3 (1886). A terrestrial or epiphytic climbing shrub, often drying brown black. *Stem* 2—3 m. high, 3—4-gonous, pubescent, at length glabrous. *Leaves*

6—20 cm. long, 2.5—4.5 cm. broad, sessile, widely amplexicaul, coriaceous, elliptic-lanceolate, pilose at apex and base when young, at length glabrous; longitudinal veins 4, rarely 3 or 5 pairs, transverse nerves obscure, irregularly reticulate; tendril 15—25 cm. long, thickened upwards towards pitcher; pitchers subdimorphic, lower cylindric-ventricose with narrow ciliate or dentate wings, upper cylindric with shallow wings or ridges: peristome cylindric, transverse or slightly oblique, finely striate; lid 2.5—4 cm. cordate-orbicular, glabrous, with immersed glands on the inner side; pitcher within glaucous purple over upper, glandular over lower half. *Inflorescence* 10—25 cm. long; raceme with 1- rarely 2-flowered pedicels. *Sepals* 4, margins tomentose. *Staminal column* longer than sepals, glabrous; anthers 12—10. *Capsule* 15—20 mm. long, brown, shining. *Seeds* 12—15 mm. long. Ridley in Journ. Linn. Soc. XXXVIII. 320 (1908) under name *N. Bongso*. Macfar. in Engl. Pfl.-reich IV. iii. 47.

PAHANG: on Mount Gunong Tahan, Robinson and Wray 5411; at 5000 ft. alt.—DISTRIB. Malaya, Sumatra.

5. *NEPENTHES SANGUINEA*, Lindl. in Gard. Chron. (1849) 580, f. 2. A terrestrial or epiphytic climbing shrub. *Stem* 2—7 m. long, trigonous, glabrous, apex pubescent, internodes short. *Leaves* 12—45 cm. long, 3—6 cm. broad, sessile, widely amplexicaul, lanceolate oblong, glabrous or slightly hairy beneath; longitudinal veins 4 rarely 5, obscure, parallel, united by obscure radiating nerves; tendril 10—20 cm. long,  $\pm$  pubescent; pitchers 10—30 cm. long, 5—8 cm. broad, subdimorphic, lower cylindric-ventricose, often greenish red to red, with expanded ciliate wings, upper cylindric to infundibuliform, reddish green or yellow-green and red spotted, with narrow usually non-ciliate wings or ridges; peristome narrowed anteriorly and posteriorly, widely expanded and sharply striate postero-laterally; lid 3—10  $\times$  2—8 cm. ovate-cordate, glandular within; pitcher within glaucous or purplish over upper half, yellow shining and glandular over lower half. *Inflorescence* 20—60 cm. long; raceme lax, pedicels delicate grey pubescent, lower 3—2-flowered upper 1-flowered. *Sepals* 4, reddish purple and glandular within. *Staminal column* pubescent below, glabrous above, anthers 8. *Ovary* quadrangular, pubescent. *Capsule* 16—25 mm. long. *Seeds* 8—12 mm. long. Griff. Not. IV. 348; Masters in Gard. Chron. (1872) 542; Hook. f. in DC. Prodr. XVII. 100 and Fl. Br. Ind. V. 70; W. G. Smith in Flor. Mag. (1874) t. 128; Planchon in Fl. d. Serr. XXII. 166, f. 2343; Veitch ort. Veitch. 303; Macfar. in Engl. Pfl.-reich IV. iii. 45. *N. pumila*,



Griff. Not. IV. 349; not *N. sanguinea* in Gard. Chron. (1882) II. 809 = *N. Veitchii*.

PERAK: *Wray* 129!; *Burbidge* on Taiping hills; *Engler* 5332!; hills near Larut, *King's Collector* 2022!, about 800 ft. elev., 2635!, at 2500—4000 ft. elev., 3307!, at 4600 ft. 3316!; Gunong Batu Putih, *King's Collector* 8018! at 3000—4000 ft.; on Maxwell's Hill 4400 ft. alt. *Fox* 183!; at Bujong Malacca, 4000 ft. alt. *Curtis* 3362!. PAHANG: at Kluang Terbang, *Barnes* 10912!. SELANGOR: at Bukit, *Kensall*!. MALACCA: at Gunong Ladong or Mount Ophir, *Griffith* 4411!; on Mount Ophir, *Lobb* 169!; *Ridley* 3174!; *Whitehead*. SINGAPORE: at Bubo, *Murton* 35! at 5000 ft.—DISTRIB. Malaya?, Borneo (*Burbidge*).

6. *NEPENTHES MACFARLANEI*, Hemsley in Proc. Linn. Soc. (1905) 12, in Gard. Chron. s. 3, XXXVII (1905) 241, 260, in Hook. Icon. Pl. XXIX tt. 2814, 2815 (1906). A low climbing often epiphytic shrub. *Stem* 2—3 m. high, trigonous, grooved, ferrugineo-hirsute when young. *Leaves* 6—20 cm. long, 2—3.5 cm. broad; sessile, semi-amplexicaul, ovate-lanceolate to obovate, glabrous or sparsely hairy along upper midrib; longitudinal veins 4 pairs, innermost starting one-third up from leaf base, transverse nerves obscure irregularly reticulate; tendril 10—20 cm. long uniform; pitchers 8—15 cm. long, 2.5—4 cm. broad, di- to tri-morphic, lower ventricose, pale green to whitish with abundant purple blotches, wings narrow below expanded and ciliate upward, mouth ovate oblique; peristome cylindric anteriorly, expanded postero-laterally, inner edge pectinate, lid 3—4.5 cm. orbicular-cordate, without glabrous, within bearing few to many long rigid unicellular hairs and circular nectar glands; pitcher within over upper third to half smooth glaucous-purple, below shining glandular; median pitchers cylindric; upper pitchers infundibuliform gradually narrowed into tendril, pale green with purple flecks and spots, wings narrow or reduced to prominent ribs, pitcher within smooth purple over triangular posterior upper area, glandular below. *Inflorescence* 15—25 cm.; raceme with biflorous hirsute pedicels each bracteolate at fork. *Sepals* 4, subovate, ferrugineo-pubescent without and with many minute glands within. *Staminal column* equal to sepals, puberulous below, anthers 6. *Ovary* ovate, shortly stalked, pubescent. *Capsule* 18—20 mm. long, shining, valves lanceolate with depressed bilobed stigma. *Seeds* 10—12 mm. long. Macfar. in Engl. Pfl.-reich IV iii. 77.

PERAK: *Scortechini*!; on Gunong Bubu, *Wray* 3849!; at 5000

ft. elev., *King's Collector* 7395!, at 5300 ft., 7421!; at Gunong Batu Putih, *Wray* 339!, at 6700 ft. *Wray* 1643!.—DISTRIB. Malaya.

7. *NEPENTHES REINWARDTIANA*, Miq. Pl. Jungh. I. 168 (1851). A graceful branched climbing shrub. *Stem* 2—3 m. high, triangular to subcylindric. *Leaves* 7—25 cm. long, 1—3.5 cm. broad, sessile, broadly amplexicaul,  $\pm$  decurrent, herbaceous, linear lanceolate, glabrous; longitudinal veins mostly 2, rarely 3 or 4 pairs, innermost starting from near middle of rib, transverse nerves obscure reticulate; tendrils 15—30 cm. long, delicate but thickening upward; pitchers 10—20 cm. long, 2—4 cm. broad, nearly uniform, cylindric or slightly ventricose below, expanded toward mouth, glabrous, semi-membranous, pale green to purple green, wings in lower pitchers expanded non-ciliate, in upper reduced to ridges; peristome ovate, oblique, cylindric, uniform, faintly striate, lid elliptic- or orbicular-cordate, glabrous with many minute glands within, pitcher internally glaucous-violet over upper half or two-thirds, with two brown "eyes" on upper posterior triangular area, below shining glandular. *Staminal inflorescence* 20—45 cm., pistillate 10—15 cm. long; raceme lax, pedicels biflorous below uniflorous above. *Sepals* elliptic, glabrous, glandular along middle within. *Staminal column* longer than sepals, ferrugineo-tomentose below, anthers 8. *Ovary* densely tomentose. *Capsule* 25—30 mm. long, tetragonous, shining. *Seeds* 15—17 mm. long, testa around embryo brown, wings pale. Miq. Fl. Ind. Bat. I. i. 1075, Suppl. 151, 366 and Ill. Fl. Archip. Ind. 4 t. 4; Hook. f. in Trans. Linn. Soc. XXII 422 as *N. Reinwardtii*, in DC. Prodr. XVII 103 and Fl. Br. Ind. V. 70; Macfar. in Engl. Pfl.-reich IV. iii. 50.

PAHANG: *Hullett* 5716! SINGAPORE: *Wallich* not 2244 = *N. gracilis*, but "prope Kuttalam lecta ab amicis Michel"!—DISTRIB. Malaya, Sumatra, Banka, Borneo, Singa, 100—200 ft. *Hullett* (*Ridley* 5693!).

8. *NEPENTHES GRACILIS*, Korth. Verh. Nat. Gesch. Bot. 22. t. 1 (1839). Much branched, delicate, low, climbing shrubs. *Stem* 2-3 m. high, greenish purple, trigonous, glabrous. *Leaves* 10—20 cm. long, 1.5—4 cm. broad, sessile, broadly amplexicaul, decurrent, linear to elliptic herbaceous, glabrous or slightly pubescent; longitudinal veins 5-7 pairs, united by irregular ascending nerves; tendrils 6—10 cm. long delicate; pitchers 6—12 cm. long, 1—3 cm. broad, subdimorphic, lower cylindric-ventricose with  $\pm$  expanded ciliate wings, upper cylindric with narrow wings or non-ciliate ridges, pale green

with fine purple spots or coloring without and within; peristome narrow, cylindric, uniform, striate; lid 1—2.5 cm., orbicular-cordate, glabrous, glandular within; pitcher over upper half within glaucous green to purple, below shining glandular, upper row of glands large. *Inflorescence* 10—40 cm. long, slender; pedicels 1- rarely 2-flowered. *Sepals* elliptic, tomentose without. *Staminal column* shorter than sepals, glabrous; anthers 12—8, convolute. *Ovary* ovate, ferrugineo-tomentose. *Capsule* 2—3 cm. long, often curved, brown, shining. *Seeds* 15 mm. long. Spach Hist. Nat. des Veg. XIII 325, t. 144; Miq. Fl. Ind. Bat. I i. 1071; Hook. f. in DC. Prod. XVII 104 and in Fl. Br. Ind. V. 71; Beccari Malesia III. 14; G. Beck in Wien. Ill. Gart. Zeit. (1895) 190; Macfar. in Engl. Pfl.-reich IV. iii. 58. *N. laevis*, Lindl. in Gard. Chron. (1848) 655. *N. Korthalsiana* Miq. l.c. 1071, Suppl. 151, 366, and Ill. Fl. Arch. Ind. (1871) 2 t. 1.

PENANG: at Batu Ferengy, *Curtis*!. PERAK: at Larut, *King's Collector* 1941!, 4019!, 4025!, 4084! at 100 ft. alt. DINDINGS: at Pulau Sembilan, *Curtis*!. MALACCA: *Jack*!; *Wallich* 2248!; *Cuming* 2310!; at Ayer Panas, *Derry*!; at Bukit Bruang, *Curtis*!. JOHOR: ? *Ridley* 11026!. SINGAPORE: *T. Anderson* 1671; at Changi, *Ridley*!. at Bukit Timah, *Ridley* (Engl. 3911)!

*N. gracilis* var. *arenaria*, *Ridley* in Hbb. Kew and Calcutta N. 1473 is a dwarf pale form, that grew in wet sandy spots at Pramau in Pahang.

9. *NEPENTHES RAFFLESIANA*, *Jack* in Comp. Bot. Mag. I. 270 (1835). A tall rarely dwarf climbing shrub. *Stem* 15 m. or less, cylindric, branched, white tomentose when young, at length glabrous. *Leaves* 20—50 cm. long, 5—10 cm. broad, subcoriaceous, petiolate, petiole 5—15 cm. long, winged, semiamplexicaul; blade oblong to elliptic, densely white tomentose when young, later glabrous; longitudinal veins usually 5 pairs, inconspicuous; lateral nerves obscure obliquely ascending, parallel; tendril 20—40 cm. long, thickened toward pitcher; pitchers 10—20 cm. long, 7—12 cm. broad, dimorphic, lower ventricose, pale green or whitish green, richly purple spotted wings widely expanded below narrowed upward, ciliate; peristome ovate, oblique, elevated posteriorly into a high neck with dentate inner edge that carries lid, purple and green striped; upper pitchers 12—30 cm. long, 4—10 cm. broad, infundi buliform, pale green, purple striate or spotted; wings narrow, shortly or not ciliate, or reduced to strong ridges; lid 4—10 cm. long, 3—8 cm. broad, ovate-oblong, without glabrous, within with 2 parallel patches of

glands between margin and middle; spur 10—30 mm. long tapered; pitcher within from mouth to upper third or fourth of length glaucous or glauco-purple, smooth, shining and richly glandular below. *Inflorescence* 15—30 cm. long, white tomentose, later subglabrous; raceme densely flowered; pedicels uni- rarely bi-florous. *Sepals* 4, ovate or elliptic, tomentose without, crimson and densely glandular within. *Staminal column* equal to sepals, glabrous, purple; anthers 20—16 irregularly biseriate. *Ovary* oblong, white-tomentose; stigma four-lobed, peltate. *Capsule* 2—4 cm. long, sparingly tomentose. *Seeds* 15—20 mm. long, testa round, embryo brown, wings white. Korthals Verh. Nat. Ges. Bot. 35 (1839); Hook. in Bot. Mag. t. 4285 (1847); Lemaire in Fl. d. Serr. III t. 213, 214 (1847); Blume Mus. Bot. Lugd.-Bat. II. 9 (1852); Miq. Fl. Ind. Bat. I. i. 1070 (1855); Van Houtte in Fl. d. Serr. XVI. 167 (1867); Hook. f. in DC. Prodr. XVII 96 (1873); Masters in Gard. Chron. II (1882) 424 tt. 69, 70; Hook. f. Fl. Br. Ind. V. 69 (1890); Macfar. in Engl. Pfl.-reich IV. iii. 61. *N. Sanderiana*, Burbidge Flora and Sylva II. 113 (1904), III 280 (1905) with col. pl.

MALACCA: on Mount Ophir, Maingay K.D. 2751!. SINGAPORE: Jack; Wallich 2242!; Beccari!; T. Anderson 162!; at Bukit Mandi, Ridley!; at Tampinis, Goodenough 4692!; at Kranji, Ridley, 3371!; at Changi, Ridley 4693!; Chanchu Kang, King's Collector 5629! at 300 ft. alt.—DISTRIB. Malaya, Sumatra, Borneo, Banka.

10. *NEPENTHES PHYLLAMPHORA*, Willd. Sp. Pl. IV. p. 2, 874 (1805). A branched, climbing or prostrate, bright green shrub. *Stem* 5—8 m. long, cylindric, sparingly stellate-pubescent when young at length glabrous, lower internodes short, upper elongate to 7 cm. *Leaves* 15—45 cm. long, 6—8 cm. broad; thin, herbaceous, petiolate; petiole 4—15 cm. long, with vertical wings, half-amplexicaul at base gradually expanded upward into the lamina; lamina elliptic-oblong, above and below glabrous or sparsely puberulous along lower rib surface, margins dentate-ciliate; longitudinal veins 6—10, commonly 7 or 8, united by many oblique parallel nerves; tendril 15—25 cm. long, thickened upwards toward pitcher; pitchers 8—15 cm. long, 2—3 cm. broad, monomorphic, subcylindric, slightly ventricose in lower half, contracted toward mouth above, pale green to reddish-green, slightly puberulous, wings narrow, ciliate or not in lower, reduced to ridges in upper pitchers; peristome cylindric, orifice circular to elliptic, transverse or slightly oblique, nearly uniform, pale green to purple; lid 2—4 cm. nearly orbicular with circular scattered

glands within; inner pitcher surface glaucous- or reddish-green over upper half, shining and with many distinct circular glands over lower half. *Inflorescence* 20—35 cm. long; peduncle and raceme stellate pubescent; pedicels 2—1-flowered below, 1-flowered above. *Sepals* 4, elliptic tomentose without, abundantly glandular within. *Staminal column* glabrous, anthers 20—16, biseriate, convolute. *Ovary* ovate, white-tomentose, style short with 4-grooved stigmas. *Capsule* 18—20 mm. long. *Seeds* 15—16 mm. long, delicate. Jack in Comp. Bot. Mag. I. 271; Korthals Verh. Nat. Gesch. Bot. (1839) 28; Blume Mus. Bot. Lugd.-Bat. II. 7; Miq. Fl. Ind. Bat. I. i, 1069; Hook. f. in Trans. Linn. Soc. XXII 422, in DC. Prod. XVII 97, and Fl. Br. Ind. V. 69; Beccari Malesia I. 213 and III. 11; Hemsley in Bot. Mag. t. 8067; Macfar. in Engl. Pfl.-reich IV. iii. 63. *Phyllamphora mirabilis*, Lour. Fl. Cochinch. 606. *N. macrostachya*, Blume and *N. fimbriata*, Blume Mus. Bot. Lugd.-Bat. II. 7; Miq. Ill. Fl. Archip. Ind. 3 t. 2, 5 t. 6. *N. distillatoria*, Wall. Cat. 2244; Aiton Hort. Kew. ed. 2, V. 420. *N. O'Brieniana*, Rodigas in Ill. Hort. (1890) 109.

KEDAH, at Langkawi Island, *Mahomed Hanif*!. PENANG: on Mount Elvira, *Curtis*!, at Waterfall, *Curtis*!. PROV. WELLESLEY: at Tassek Glugor, *Curtis*!. PERAK: at Ulu Bubong, *King's Collector* 10631! at 400—600 ft. alt.; at Telok Bahang, *Curtis*!. SINGAPORE: *Wallich* 2244!; at Changi, *Ridley*.—DISTRIB. China and Cochin China, Malaya, Sumatra, Borneo and N. Guinea?, N. Australia.

### Family XCVIII. PIPERACEAE.

By C. DE CANDOLLE.

Herbs or shrubs or small trees, growing on the soil or epiphytic, parenchyma with aromatic or resiniferous cells. Stem and branches containing either (in *Peperomia*) a system of distinct fibrovascular bundles with limited centrifugal growth, disposed in more or less concentric rows and anastomosing together in the nodes; or (in *Piper*) two fibrovascular systems, one of which is composed of peripheric bundles with unlimited centrifugal growth, the other of intramedullary bundles with limited centrifugal growth; the bundles of both systems anastomosing together in the nodes. *Leaves* simple, entire, exstipulate in *Peperomia*, stipulate in *Piper*. *Inflorescence* spiciform. *Flowers* very small, 1—2-sexual. *Perianth* 0. *Stamens* 1—10, hypogynous or connate with the ovary at its extreme base, rarely higher. *Ovary* 1-celled, a single terminal orthotropous ovule.

*Fruit* (a berry) indehiscent. *Seed* adherent to the endocarp; embryo-sac persistent at the apex of a copious perisperm, including the dicotyledonous embryo and a scanty endosperm; radicle superior.

Stigma globular or rarely bilobed, very small; fruit minute,  
0.5—2 mm. long. Leaves exstipulate .. .. 1. *PEPEROMIA*.  
Stigmas 2—6, very rarely a single globular stigma (so far  
only in two species); fruit small, 3—11 mm. long.  
Leaves stipulate .. .. 2. *PIPER*.

# 1. *PEPEROMIA*, Ruiz and Pavon.

Herbs, annual or perennial, usually succulent. *Leaves* exstipulate, alternate or (seemingly) opposite or verticillate. *Spikes* pedunculate, either solitary and inserted in the axils of fully developed leaves, or terminal, or inserted in the axils of imperfect leaves and then geminate or paniculate or umbellate, or very rarely epiphyllous. *Bract* very small, usually hypopeltate, seldom squamiform. *Flower* bisexual, sessile or subsessile, often sunk with its bract in a depression of the rhachis very rarely (only in two West Indian species) connate with its bract. *Stamens* 2, lateral, hypogynous; anthers extrorse, 2-celled, bivalvate when opening. *Ovary* free, formed by a single carpel; stigma globular or rarely bilobed, always very small and sometimes hardly visible; ovule with a single integument. *Berry* usually rounded at its base or more rarely contracted into a slender stipe.

## 1°. Leaves opposite or the upper ones ternate-quaternate.

### a. Stem and leaves more or less pubescent.

Stigma inserted obliquely a little below the summit of the ovary; limb of leaf elliptic or obovate-elliptic, cuneate at the base, up to 4 mm. long .. 1. *P. dindigulensis*.

Stigma terminal; limb of leaf obovate or rounded-obovate, acute or subacute at the base, 12.5—20 mm. long .. 2. *P. Wrayi*.

### b. Stem and leaves glabrous.

Stigma terminal; limb obovate or elliptic-rhomboid, rounded at the apex, acute at the base, 26—40 mm. long .. 3. *P. portulacoides*.

## 2°. Leaves alternate.

### a. Limb glabrous on both surfaces.

Stigma inserted obliquely a little below the summit of the ovary. Limb elliptic, cuneate at the base, obtuse at the apex, up to 40 mm. long.. 4. *P. Maxwelliana*.

Stigma terminal.

Berry globose, uniformly glandulose-asperulate. Limb rounded-ovate, cordate at the base, obtuse at the apex, up to 29 mm. long, and 31 mm. wide .. 5. *P. malaccensis*.



Berry covered with longitudinal glandulose-asperulate riblets. Limb deltoid-cordate, subobtusely acuminate at the top, up to 26 mm. long and 19 mm. wide 6. *P. pellucida*.

b. Limb densely hirtellous on both surfaces.

Stigma inserted obliquely a little below the summit of the ovary. Limb rounded-obovate, 23 mm. long,

14.5 mm. wide .. .. . 7. *P. kotana*.

1. *PEPEROMIA DINDIGULENSIS*, Miq. Syst. Pip. 122, in Hook. Journ. Bot. V. 549 and Ill. Pip. 19, t. 13. Erect, stem and branches puberulous. *Leaves* opposite or the terminal ternate, moderately long-petioled; limb membranous when dry, elliptic or obovate-elliptic, cuneate at the base, obtuse or subobtusate at the top, puberulous on both surfaces, 5-nerved; up to 45 mm. long and 38 mm. wide; petiole puberulous, about 8 mm. long. *Peduncles* axillary and terminal, about 8 mm. long, puberulous. *Spikes* 7—8 cm. long, filiform, glabrous; limb of bract rounded, subsessile at its centre; anthers elliptic; ovary emergent, obovate; stigma globular, glabrous, obliquely inserted slightly lower than the apex of the ovary. C. DC. in Prodr. XVI. i. 442; Wight Ic. t. 1921; Hook. f. Fl. Br. Ind. V. 98 exclud. syn. *P. Thwaitesii*, C. DC. *P. Heyneana*, Wight Ic. t. 1922. *Piper ovalifolium*, Heyne in Wall. Cat. n. 6663 A. and B. (except lower specimen, vide Hook. f. l. c.).

PAHANG: top of the Kota Glanggi caves, Ridley 2346. SELANGOR: rocks at Batu caves, Ridley.—DISTRIB. India (Deccan Peninsula, rocks of Dindigul).

2. *PEPEROMIA WRAYI*, C. DC. in Records Bot. Survey Ind. VI. 1. (191?). Stem decumbent, puberulous, rooting at the nodes; branches erect, densely puberulous, nearly 1 mm. thick, angulose when dry, ramulose, up to 10.5 cm. long. *Leaves* opposite, petioled; limb puberulous at the margins on the upper surface, otherwise glabrous, obovate or the uppermost rounded-obovate, acute or subacute at the base, the lower up to 20 mm. long and 7—15 mm. wide, the uppermost 6 mm. in diam.; petiole densely puberulous, 4—6 mm. long. *Peduncles* terminal, glabrous, up to 12.5 mm. long. *Spikes* about 24 mm. long and 1 mm. thick, glabrous; limb of bract rounded with short central pedicel; anthers elliptic, filaments very short; ovary ovate, stigma terminal, glabrous. *Berry* globose, asperulate, nearly 1 mm. in diam., its base immersed in the rhachis.

PERAK: upper part of the valley of the Batang Padang, at 1500—2000 ft. altitude, on dead tree, Wray 1455.

3. *PEPEROMIA PORTULACOIDES*, A. Dietr. Sp. Pl. Ed. VI. I. 172 (1831). Herb: succulent, quite glabrous; branches erect from a creeping stem, up to 6 mm. thick, flattened when dry. *Leaves* opposite or the upper ones ternate-quaternate, petioled; limb membranous when dry, pellucid-dotted, obovate or elliptic-rhomboid, acute at the base, rounded at the top, 3-nerved; 26—40 mm. long and up to 26 mm. wide; petiole 5—12 mm. long. *Peduncles* axillary and terminal, 3—4 cm. long. *Spikes* up to 5 cm. long, filiform when dry; limb of bract round with a very short central pedicel; anthers subglobose; ovary turbinate, emergent; stigma terminal, punctiform, puberulous. Miq. Syst. Pip. 130 and in Hook. Lond. Journ. Bot. V. 550; C. DC. in Prodr. XVI. i. 443; Wight Ic. t. 1922; Hook. f. Fl. Br. Ind. V. 98. *P. Candolleana*, Miq. Syst. Pip. 130. *Piper portulacoides*, Lam. Ill. 82; Vahl. Enum. I. 350. *P. Trifolium* Herb. Willd. n. 737.

SELANGOR: rocks at Batu caves, *Ridley*.—DISTRIB. India (Travancore mountains, Courtallum), Bourbon, Mauritius.

4. *PEPEROMIA MAXWELLIANA*, C. DC. in Records Bot. Surv. Ind. VI. 1. (1912). Stem decumbent, rooting at the nodes; spiciferous branches erect, glabrous, nearly 1 mm. thick when dry. *Leaves* alternate, moderately long petioled; limb subcoriaceous and fuscous when dry, elliptic, obtuse at the top, cuneate at the base, 3-nerved, glabrous on both surfaces and very minutely ciliate at the margins near the summit, up to 40 mm. long and 20 mm. wide; petiole glabrous, 5 mm. long. *Peduncles* terminal and axillary, glabrous, 8—10.5 mm. long. *Spikes* glabrous, up to 5 cm. long, little less than 1 mm. thick, densiflorous; limb of bract orbicular, 0.5 mm. in diam., subsessile at its centre; ovary emergent, obovate; stigma glabrous, obliquely inserted slightly lower than the top of the ovary; bract and ovary reddish-punctulate when dry.

PERAK: Maxwell's hill, *Ridley* 5481.

5. *PEPEROMIA MALACCENSIS*, *Ridley* in Kew Bull. (1895) 185, ex C. DC. in Records Bot. Surv. Ind. VI. 2. Stems prostrate, succulent, glabrous, subangulose, rooting from the nodes, little more than 1 mm. thick when dry. *Leaves* alternate, moderately long petioled, glabrous; limb dark green or cupreo-fuscous when living, fuscous and membranous when dry, rounded-ovate, the base not deeply cordate, the summit obtuse, 5-nerved, 29 mm. long and up to 31 mm. wide; petiole 12.5 mm. long. *Peduncles* terminal, nearly as long as the petiole, glabrous. *Spikes* 38 mm. long when flowering, glabrous;

limb of bract oblong-rounded with a central pedicel immersed with the flower in the rhachis; ovary globose, stigma terminal, minute, glabrous. *Berry* globose, asperulate, its base immersed in the rhachis, nearly 1 mm. in diam.

MALACCA: Batu Tiga, rocks in forest, *Derry* 80.

6. *PEPEROMIA PELLUCIDA*, Kth. in H. B. K. Nov. Gen. 1. 64 (1815); Kunth Syn. I. 117; Pl. Aeq. II 53. Annual, erect, quite glabrous, about 30 cm. high, ramulose; branches pellucid when dry. *Leaves* alternate, petioled; limb membranous and pellucid when dry; deltoid-cordate, subobtusely acuminate, 7-nerved, up to 26 mm. long and 19 mm. wide; petiole 14.5 mm. long. *Peduncle* terminal, leaf-opposed, nearly as long as the petiole. *Spike* about twice as long as the leaf, filiform membranous when dry, glabrous; limb of bract round, subsessile at its centre; anthers rounded, filaments very short. *Berry* globose, mucronate at the apex, with longitudinal verruculose ribs; stigma terminal, puberulous. A. Dietr. Sp. Pl. Ed. VI. 1. 164; Miq. Syst. Pip. 79 and in Hook Lond. Journ. Bot. IV. 413; C. DC. in Prodr. XVI. i. 402; Dahlst. Stud. S. and C. Amerik. Peper. 16, t. 1, fig. 1. *Piper pellucidum*, L. Sp. I. 163; J. Hill Veg. Syst. XXVI. t. 18, fig. 3; Aublet Hist. Pl. Guy. I. 21; Lam. Ill. 82; Vahl Enum. I. 346; Willd. Sp. Pl. I. 163; Spreng. Syst. Veg. 117.

Naturalized. PENANG: Common in the town, *Curtis* 1968. PERAK: *Wray* 1769. TRINGGANU, Bundi, *Rostado*. SINGAPORE: Deschamps; shady places, *Kunstler* 211.—DISTRIB. Trop. America, West Indies, Trop. Africa, Malayan Archipelago, India (Poona, *Cooke*; Andamans *King's Coll.* 11891).

7. *PEPEROMIA KOTANA*, C. DC. in Records Bot. Surv. Ind. VI. 2 (1912). Stem erect from a creeping base, densely hirtellous, about 1 mm. thick when dry. *Leaves* alternate, petioled; limb densely hirtellous, on both surfaces, rounded-obovate, 23 mm. diam. in the inferior leaves; elliptic, subacute at the base, rounded at the top, 23 mm. long, 14.5 mm. wide, 5-nerved in the superior leaves; petiole densely hirtellous, 10 mm. long in the inferior, 4 mm. long in the superior leaves. *Peduncle* terminal. *Spike* 27 mm. long, 1 mm. thick, glabrous, densiflorous; limb of the bract obovate, subsessile at its centre, brown-dotted when dry; anthers rounded; ovary emergent, obovate; stigma punctiform, glabrous, inserted obliquely and slightly lower than the top of the ovary.

PAHANG: Kota Glanggi, *Ridley*.

This species is very much like *P. convexa*, Miq., from which it differs by its obovate bract.

## 2. PIPER, L. (*pro parte*).

Shrubs or small trees, with swollen nodes. *Leaves* provided with stipules inserted on the margins of the petiolar sheath. *Spikes* pedunculate, usually oppositifolious, rarely axillary or condensed at the top of an axillary ramulet. *Flowers* unisexual or bisexual, sessile or rarely pedicellate. *Stamens* 2—6, rarely 1 or 8—10, hypogynous or connate with the ovary at its base, rarely higher; anthers deciduous, usually 4-valvate, rarely 2-valvate when opening, slits lateral, filaments persistent. *Ovary* free or partly imbedded in and connate with the rhachis; stigmas 2—6, very rarely a single terminal stigma.

### Key to the Sections.

#### A. Flowers sessile.

##### a. Spikes oppositifolious.

Bracts not connate .. .. SECTION I, EUPIPER.

Bracts connate at their lower and

upper ends .. .. SECTION II, MULDERA.

##### b. Spikes condensed at the top of an

axillary ramulet .. .. SECTION III, HECKERIA.

#### B. Flowers pedicellate .. .. SECTION IV, ENCKEA.

### SECT. I.—EUIPER C. DC. in *Prodr.* XVI. 1. 339, *emend.*

*Spikes* oppositifolious. *Bracts* not connate, hypopeltate, with a central pedicel or subsessile or adnate to the rhachis and then free only at their ends and lateral margins. *Flowers* sessile, unisexual or rarely bisexual. *Stamens* 2, lateral, rarely 3—4 of which 2 are lateral. *Ovary* free or partly imbedded in and conerescent with the rhachis.

### Key to the species of the Malayan Peninsula.

(All dioecious, except ns. : 7, 25, 32, 46, 48 which are polygamous.)

*N.B.*—All measurements and other foliar characters indicated in this key and in the diagnoses always refer to the leaves of the upper part, that is to say of the flowering part of branches. The width of leaves is taken from their widest portions.

#### A. Berry not stipitate. (Nos. 1—29).

1°. Bract not adnate to the rhachis, rounded or obovate, with central pedicel or sessile. (Nos. 1—13).

a. A single orbicular or globose stigma, berry partly imbedded in the rhachis. (Nos. 1—2).

Δ Leaf entirely glabrous. Limb oblong-elliptic-lanceolate, 9.5—11.5 cm. long, 2—3 cm. wide .. 1. *P. globulistigma*

- △△ Leaf more or less pubescent, hairs ramulose. Limb oblong-elliptic-lanceolate, up to 12 cm. long, and 5 cm. wide .. .. . 2. *P. ramipilum*.
- b. Stigmas 3-4-5. (Nos. 3-23).
- △ Ovary and berry prolonged upwards into a style. (Nos. 3-7).
- × Limb multinerved.<sup>1</sup> Berry partly imbedded in the rachis.  
 Leaf entirely glabrous. Limb elliptic-lanceolate, 8.5-9.5 cm. long, 3.2-3.5 cm. wide.. .. 3. *P. rufispicum*.
- ×× Limb multiplinerved.<sup>2</sup> Ovary and berry free.  
 — Leaf entirely glabrous.
- + Bract orbicular; spike much shorter than the leaf.  
 Limb oblong-elliptic-lanceolate, 11-13 cm. long, 3-4 cm. wide .. .. . 4. *P. penangense*.
- ++ Bract obovate; spike nearly as long or longer than the leaf.  
 Limb elliptic-lanceolate, 12-13.5 cm. long, 5-5.7 cm. wide .. .. . 5. *P. conibaccum*.  
 Limb elliptic-lanceolate, 15-22 cm. long, 6-10.5 cm. wide .. .. . 6. *P. magnibaccum*.
- Leaf glabrous above, pubescent underneath, young branches retrorsely hirsute.  
 Limb elliptic, 11-15 cm. long, 5.5-7 cm. wide .. 7. *P. stylosum*.
- △△ Ovary and berry without styles. (Nos. 8-23).
- Ovary and berry free. (Nos. 8-18).
- × Limb multinerved. (Nos. 8, 9).
- Leaf entirely glabrous. Limb oblong-ovate, acutely acuminate, the base rounded on one side, attenuate on the other side .. .. . 8. *P. flavibaccum*.
- Leaf hirsute on the petiole and base of the limb.  
 Limb oblong-ovate, acutely acuminate, the extreme base half-cordulate.. .. . 9. *P. miniatum*.
- ×× Limb multiplinerved. (Nos. 10-17).
- Limb entirely glabrous. (Nos. 10-15).
- + Base of the limb rounded on both sides or at least on one side.
- Base of the limb equilateral or nearly so. Limb ovate, acutely acuminate, 11.5 cm. long, nearly 5 cm. wide .. .. . 10. *P. semangkoanum*.
- Base of the limb distinctly inequilateral .. 11. *P. gymnocladum*.  
 Limb oblong-elliptic, acutely acuminate, up to 18.8 cm. long .. .. . 12. *P. boehmeriaefolium* (forma).

<sup>1</sup> That is to say with all the main nerves free from the base.

<sup>2</sup> That is to say with some of the main nerves issuing from the central nerve, the others free from the base.

- + + Base of the limb attenuate on both sides.
- Spiciferous branches glabrous
  - Limb 7.6 cm. long, ovate-lanceolate. Peduncle  
much longer than the petiole .. .. 13. *P. lonchites*.
  - Limb 16 cm. long, elliptic-lanceolate. Bract rounded 14. *P. gymnophyllum*.
  - Limb 15—22 cm. long, elliptic-lanceolate. Bract  
obovate .. .. 6. *P. magnibaccum*.
- Spiciferous branches puberulous. Limb up to  
8.5 cm. long, ovate-lanceolate .. .. 15. *P. puberuli*.  
rameum.
- Limb glabrous above, pubescent underneath. (Nos.  
16, 17).
- + Base of limb cordate and equilateral. Limb up to  
22 cm. long, rounded ovate, acutely acuminate .. 16. *P. velutinervium*.
- + + Base of limb rounded on both sides and equilateral.  
Limb about 9 cm. long, ovate, acutely acuminate .. 17. *P. sarmentosum*.
- + + + Base of limb rounded on one side, attenuate on  
the other. Limb up to 12 cm. long, oblong-  
elliptic-lanceolate .. .. 12. *P. boehmeriae*-  
folium, var. lanatum.
- x x x Limb penninerved,<sup>1</sup> entirely glabrous, attenuate  
at the base.  
Limb oblong-elliptic-lanceolate, 12—15 cm. long .. 18. *P. Scortechinii*.
- Ovary and berry partly imbedded in the rhachis.  
(Nos. 19—23).
- x Limb multinerved, glabrous above puberulous  
underneath on the nerves. Base of limb cordate  
and equilateral. Limb oblong-ovate acutely  
acuminate .. .. 19. *P. longum*.
- x x Limb multiplinerved.
- Limb entirely glabrous.
- + Berry glabrous.  
Limb ovate or rounded-ovate, subacutely acuminate,  
up to 5 cm. long .. .. 20. *P. subfragile*.
- Limb ovate, acutely acuminate, 13.5 cm. long,  
7 cm wide .. .. 21. *P. minutistigmum*.
- + + Berry tomentose. Limb ovate or rounded-ovate,  
acutely acuminate, 10—13 cm. long .. 22. *P. Bette*.
- Limb glabrous above, pubescent underneath, amply  
ovate, acutely acuminate, up to 22.5 cm. long,  
the base cordate and inequilateral .. 23. *P. febrifugum*.
- 2°. Bract adnate to the rhachis, obovate-oblong or  
elliptic-oblong or oblong. (Nos. 24—29).
- a. Bract free at both ends and along its lateral and  
thinned margins. (Nos. 24—28).

<sup>1</sup> That is to say with all its main lateral nerves issuing from the central nerve.



- Limb entirely glabrous, multiplinerved, the base attenuate on both sides. (Nos. 24—27).
- + Bract quite glabrous. (Nos. 24—28).  
 Limb elliptic, acutely acuminate, nearly 10·5 cm. long, red underneath .. .. 24. *P. porphyrophyllum*.
- Limb elliptic-lanceolate, acutely and rather long acuminate, 11—15 cm. long, 5—9 cm. wide.  
 Anthers rounded .. .. 25. *P. nigrum*.
- Limb elliptic-lanceolate, acutely and rather long acuminate, 13—15 cm. long and 4·5—5·5 cm. wide. Anthers ovate .. .. 26. *P. flavispicum*.
- + + Bract minutely puberulous on the back and ciliate.  
 Limb elliptic-lanceolate, acutely acuminate, 7·5—10 cm. long .. .. 27. *P. longicaule*.
- Limb glabrous above, puberulous underneath, penninerved.  
 Limb elliptic, acutely acuminate, 12 cm. long, the base rounded on one side.. .. 28. *P. kotanum*.
- b. Bract free at both ends, its lateral margins not thinned.  
 Limb elliptic, acutely acuminate, about 10·5 cm. long, 4·5—6·5 cm. wide, the base rounded on both sides .. .. 29. *P. leptoneura*.
- B. Berry stipitate. (Nos. 30—48).
- 1°. Bract rounded. (Nos. 30—32).
- x Limb multiplinerved.
- Limb entirely glabrous, 10—13 cm. long. Bract glabrous.  
 Limb ovate, acutely acuminate, cordate at the base 30. *P. dindingsanum*.  
 Limb lanceolate .. .. 31. *P. caninum* var. *glabrum*.
- Limb glabrous above, pubescent underneath, 9—11·5 cm. long. Bract pubescent.  
 Limb ovate-oblong, acutely acuminate, attenuate at the base .. .. 31. *P. caninum*.
- x x Limb penninerved, pubescent on both surfaces, elliptic-lanceolate, up to 17·5 cm. long .. 32. *P. malaccense*.
- 2°. Bract obovate or oblong-elliptic. (Nos. 33—48).
- x Limb multinerved, entirely glabrous.  
 Limb oblong-ovate, subobtusely acuminate, up to 9 cm. long .. .. 33. *P. selangorensis*.
- x x Limb multiplinerved. (Nos. 34—42).
- Limb entirely glabrous. (Nos. 34—41).
- Bract not adnate to the rhachis, with a central pedicel or sessile. (Nos. 34—37).
- Base of limb rounded on one side, attenuate on the other side.  
 Limb oblong-ovate acutely acuminate, up to 12·5 5 cm. long .. .. 34. *P. subalbicans*.

- □ Base of limb attenuate on both sides and equilateral.  
+ Limb 5-plinerved.  
Limb subovate-elliptic-lanceolate, subacutely acuminate, 9—11·5 cm. long .. .. . 35. *P. Curtisii*.  
Limb oblong-elliptic, acutely acuminate, up to 10·5 cm. long .. .. . 36. *P. paucistigmum*.  
++ Limb 7-plinerved, elliptic-lanceolate, acutely acuminate, up to 7·5 cm. long .. .. . 37. *P. Maxwellianum*.  
● ● Bract adnate to the rachis and free only at the margin. (Nos. 38—42).  
□ Base of limb cordate or cordulate, or obtuse.  
Limb ovate, subobtusely acuminate, 9 cm. long, 38—44 mm. wide .. .. . 38. *P. pedicellosum*.  
Limb oblong-ovate or subobovate-oblong, acutely attenuate, about 25 cm. long, 11 cm. wide .. .. . 39. *P. ribesoides*.  
Limb oblong-elliptic, acutely and rather long acuminate, about 10·5 cm. long, 42 mm. wide .. .. . 40. *P. mucronatum*.  
□ □ Base of limb attenuate and equilateral.  
— Limb glabrous on both sides.  
Limb elliptic-lanceolate, acutely acuminate, 11·5 cm. long, 6 cm. wide .. .. . 41. *P. longibracteum*.  
— Limb glabrous above, pubescent underneath.  
Limb elliptic-lanceolate, acutely acuminate, up to 14·5 cm. long, 6 cm. wide .. .. . 42. *P. xanthocarpum*.  
× × × Limb penninerved. Bract obovate or oblong. (Nos. 43—48).  
— Limb entirely glabrous. (Nos. 43, 44).  
● Base of limb rounded on one side, attenuate on the other side.  
Limb oblong-elliptic, acutely acuminate, 13—16 cm. long, 4·8—7 cm. wide .. .. . 43. *P. larutanum*.  
● ● Base of limb attenuate on both sides.  
Limb elliptic-lanceolate, acutely acuminate, 13—16 cm. long, 4·8—7 cm. wide .. .. . 44. *P. collinum*.  
— Limb pubescent on both surfaces. Bract shortly pedicellate. (Nos. 45—48).  
● Base of limb cordate or cordulate.  
Limb oblong-elliptic, shortly and subacutely acuminate, up to 17 cm. long and 7 cm. wide .. .. . 45. *P. muricatum*  
*forma peninsularis*.  
Limb oblong acutely acuminate, 20·8—33·8 cm. long, 4·2—5·6 cm. wide .. .. . 46. *P. protractum*.  
● ● Base of limb rounded and slightly inequilateral.  
Limb subobovate-elliptic, acutely acuminate, stipe hirtellous .. .. . 45. *P. muricatum*,  
*forma pilosipes*.  
● ● ● Base of limb rounded on one side, attenuate on the other side.

- Limb obovate-oblong, acutely acuminate, 20 cm.  
long, up to 7 cm. wide .. .. 47. *P. bipedale*.
- Base of limb attenuate on both sides and equilateral.  
Limb lanceolate-elliptic, acutely acuminate, nearly  
25 cm. long, 12 cm. wide.. .. 48. *P. Ridleyi*.
- C Ovary and berry unknown. (Nos. 49—60).
- 1°. Bract not adnate to the rhachis, rounded or obovate  
with a central pedicel or sessile. (Nos. 49—58).
- × Limb multiplinerved. (Nos. 49—57).
- Limb entirely glabrous. (Nos. 49—55).
- Base of limb rounded on both sides and slightly  
inequilateral.
- Bract glabrous.  
Limb ovate, acutely attenuate, up to 16.5 cm. long,  
9 cm. wide .. .. 49. *P. nigrantherum*.  
Limb oblong-ovate, acutely acuminate, about 9 cm.  
long, 4 cm. wide .. .. 50. *P. filipes*.
- Bract pubescent. Limb oblong-elliptic, shortly and  
obtusely attenuate, up to 9.5 cm. long, 3.5 cm.  
wide .. .. 51. *P. rufibracteam*.
- Base of limb rounded on one side, attenuate on  
the other side.  
Limb elliptic-oblong, acutely and rather long  
acuminate, 12.5 cm. long, 4.5 cm. wide .. 52. *P. Kunstleri*.
- Base of limb attenuate on both sides.
- Bract rounded.  
Limb elliptic-lanceolate, equilateral at the base,  
8.5 cm. long, 2.6 cm. wide .. 53. *P. curtipetiolum*.  
Limb elliptic-oblong, nearly equilateral at the base,  
up to 15 cm. long and 4 cm. wide .. 54. *P. erecticaule*.
- Bract subobovate-elliptic.
- Limb elliptic-lanceolate, inequilateral at the base,  
14.5 cm. long, 4 cm. wide .. 55. *P. eucalyptolim-*  
*bum*.
- Limb glabrous above, pubescent underneath.  
Base of limb cordate. Limb rounded-ovate,  
obtusely acuminate, up to 15 cm. long, 14 cm.  
wide .. .. 56. *P. subrubrispicum*.
- Limb pubescent on both surfaces.  
Base of limb attenuate on both sides and equilateral.  
Limb oblong-ovate-lanceolate, up to 10.5 cm. long,  
3.5 cm. wide .. .. 57. *P. longamentum*.
- × × Limb penninerved, entirely glabrous. Base of limb  
attenuate on both sides.  
Limb subsessile, subobovate-elliptic-oblong, acutely  
acuminate, up to 19 cm. long, 5 cm. wide .. 58. *P. subsessilim-*  
*bum*.

2°. Bract adnate to the rhachis, oblong or obovate-oblong, free at both ends and at its lateral margin. (Nos. 59, 60).

Limb entirely glabrous, multiplinerved, the base rounded or subrounded on both sides.

Anthers obovate. Limb elliptic, acutely acuminate, 14 cm. long, 9 cm. wide .. .. 59. *P. obovantherum*.

Anthers reniform. Limb oblong-ovate, acutely acuminate, up to 18 cm. long and 6 cm. wide .. 60. *P. argyrites*.

D. Inflorescence unknown. .. .. 61. *P. clypeatum*.

1. *PIPER GLOBULISTIGMUM*, C. DC. in Records Bot. Surv. Ind. VI. 3 (1912). Branches glabrous, light brown when dry, the spiciferous up to 1 mm. thick; collenchyma continuous, not libriform; no peripheral lysigenous canal; many dark brown cells in bark and pith. *Leaves* shortly petioled, glabrous; limb rigid and opaque, 9.5–11.5 cm. long and 2–3 cm. wide, oblong-elliptic-lanceolate, acutely and rather long attenuate, the sides of the base unequally long, the shortest tapering, the longest rounded; penninerved, the central nerve emitting on each side 3 alternate ascendent nerves, the uppermost from 24–36 mm. above the base; petiole about 5.5 mm. long, 2 of which between the side of the limb, sheath basal. *Peduncle* glabrous, 26 mm. long. *Spike*: ♀ cylindric, 52 mm. long and 1 mm. thick when ripe; rhachis densely velutino-puberulous; bract glabrous, its limb orbicular, rigid, 1 mm. in diam. with a very short central pedicel. *Berry* partly imbedded in the rhachis, its upper free portion rounded and densely velutino-puberulous; a single stigma, globular and very small.

PERAK: *Scortechini*!

2. *PIPER RAMIPILUM*, C. DC. in Records Bot. Surv. Ind. VI. 3 (1912). Creeper, up to 9 m. long. Branches pubescent when young, soon glabrous, the spiciferous 2 mm. thick drying brown; hairs ramulose in the female but not so in the male; collenchyma continuous, not libriform; a single central lysigenous canal. *Leaves* shortly petioled; limb rigid-membranous when dry, subpellucid-dotted, up to 12 cm. long and 5 cm. wide, glabrous above, pubescent on the nerves underneath, the hairs ramulose; ovate elliptic, acutely acuminate, the base cordulate and slightly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent alternate nerves, the uppermost from about 32 mm. above the base, and having on each side of it 2 nerves free from the base, the external more arcuate and much shorter than the others; petiole densely pubescent, 8 mm. long, of

which 2 mm. between the sides of the limb, sheath prolonged up to the middle of the petiole; stipules glabrous, confluent in an obtuse apex. *Peduncle* sparingly pubescent, 20—24 mm. long, slender. *Spike*: ♂ about 7·8 cm. long, up to 2 mm. thick, attenuate at the top; rhachis glabrous; bract glabrous, its limb rounded 1 mm. in diam; stamens 2, anthers elliptic, 2-valvate: ♀ 10·5 cm. long and a little over 2 mm. thick when ripe, obtuse at the top; rhachis and bract as in the male; ovary glabrous, its base partly imbedded in the rhachis; a single minute orbicular stigma. *Berry* free except at its extreme base, globose, about 1 mm. in diam., orange or dark-yellow when living, black when dry.

PENANG: at Balik Pulau at 800—1000 ft. alt., *Curtis* 792; *Kunsiler* 1481; *Deschamps*. PERAK: at Gunong Bulang, on trees, *King's Collector* 270; at Gunong Keledang, *Ridley* 9582; at Larut, *King's Collector* 3574; JOHORE: at Bukit Saya, *Ridley* 11022.

3. *PIPER RUFISPICUM*, C. DC. in Records Bot. Surv. Ind. VI. 4 (1912). Branches glabrous, light brown when dry, the spiciferous about 1 mm. thick; collenchyma in distinct laterally widened bundles, its inner zone libriform; a central and several peripheric lysigenous canals. *Leaves* glabrous; limb rigid and opacous, 8·5-9 cm. long and 3·2—3·5 cm. wide, elliptic-lanceolate, acutely attenuate, the base slightly inequilateral, attenuate on one side, sub-attenuate on the other side; 6-nerved, 3 nerves on one side and 2 on the other side of the limb. *Peduncle* glabrous, 13 mm. long. *Spike*: ♀ cylindric, rounded at the top, 5·7 cm. long, 2·6 cm. thick; rhachis rufo-tomentose; bract suborbicular, emarginulate at the top, minutely glandulose on both surfaces, sessile at its centre, 1 mm. in diam. *Berry* deeply imbedded in the rhachis, with a free conic and slender style about 1·5 mm. long; stigmas 4, short, ovate-acute.

PERAK: at Ijuk, *Scortechini* 1177.

4. *PIPER PENANGENSE*, C. DC. in Prod. XVI. i. 353 (1869). Erect, about 2 ft. high. Branches glabrous, fuscous when dry; the spiciferous nearly 2 mm. thick; collenchyma in distinct, laterally much widened, bundles and not libriform; a single central lysigenous canal. *Leaves* glabrous, shortly petioled; limb membranous when dry, minutely pellucid-dotted, 11—13 cm. long, 3—4 cm. wide, oblong-elliptic-lanceolate, acutely acuminate, the base equilateral, acute or nearly so; 7-plinerved, the central nerve emitting 2 ascendent alternate nerves, the uppermost from about 18 mm. above its base,



and having on each side of it 2 lateral ascendent nerves free from the base; petiole 4—6 mm. long, sheath basal. *Peduncle* glabrous, about 15 mm. long. *Spike*: ♀ ovate-globose, nearly 4—6 mm. long, rhachis pilose; bract glabrous, orbicular, subsessile, 1.5 mm. in diam.; ovary free, glabrous, ovate, with an elongated style and 3—4 ovate-acuminate stigmas. *Berry* sessile, globose, about 3.5 mm. long with its slender style. Hook f. Fl. Brit. Ind. V. 88 *Chavica penanensis*, Miq. Syst. Pip. 279, Illustr. 45. t. 44.

PENANG: *Wallich* 6642 B. (in Herb. Berol), 6644 B. (in Herb. Hook.); Ulu Selama, *Wray* 4170. PERAK: at Gunong Inas, *Scortechini*; *Wray* 4087.

5. *PIPER CONIBACCUM*, C. DC. in Records Bot. Surv. Ind., VI. 4 (1912). Branchlets glabrous, the spiciferous 4 mm. thick, 6—7-costellate, the riblets membranous; collenchyma in distinct and laterally widened bundles, not libriform; a single central lysigenous canal, abundant yellow cells in bark and pith. *Leaves* shortly petioled, glabrous; limb firm when dry, 12—13.5 cm. long, 5—5.7 cm. wide, elliptic-lanceolate, subacutely acuminate, the base equilateral, acute; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 20—30 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 10 mm. long, sheath basal. *Peduncle* as long as the petioles. *Spike*: ♀ nearly 40.3 cm. long; rhachis glabrous; bract glabrous, its limb obovate, attenuate in its lower part, 2 mm. long; ovary free, attenuate into a conic style; stigmas 3—5, more rarely 5 and sometimes 2, linear. *Berry* glaucescent when dry, its style 7 mm. long.

SELANGOR: at Semangko, *Ridley* 17056.

6. *PIPER MAGNIBACCUM*, C. DC. in Records Bot. Surv. Ind. VI. 5 (1912). Scandent. Branches glabrous, drying brown, the spiciferous up to 6 mm. thick and costellate; collenchyma in distinct laterally widened bundles, not libriform; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb subcoriaceous when dry, 15—22 cm. long, 6—10.5 cm. wide; elliptic-lanceolate, acutely acuminate, the base acute and equilateral; 7—9-plinerved, the central nerve emitting 2 opposite ascendent nerves from 20—26 mm. above the base and having on each side of it 2—3 ascendent nerves free from the base, the external much shorter than the others; petiole about 20 mm. long, sheath basal. *Peduncle* nearly as long as the petiole, glabrous, 2 mm. thick when dry. *Spike*: ♀ about



21 cm. long, rhachis glabrous; bract glabrous, its limb obovate, up to 3 mm. long, more or less prolonged and lacerate at its lower end, widely subsessile; ovary free, glabrous, ovate attenuate at the top; stigmas 3—4, linear, acute and recurved. *Berry* sessile, globose and acuminate at the top, black when dry.

PERAK: Maxwell's hill, alt. 4000 ft., September, *Curtis* 2046; at Thaiping, March, *Ridley* 2963, 5480; at Larut, rare, growing closely to the stem of a tree in dense jungle, *King's Collector* 6369; at Maxwell's hill, alt. 3800 ft, Wray 4239. SELANGOR: Semangko pass, April, *Ridley* 15569.

This species will probably, when the male is known, have to be placed in Section SARCOSTEMON perhaps as a form of *P. Korthalsii* Miq. with larger and multinerved leaves, longer spikes and bracts not adnate.

7. PIPER STYLOSUM Miq. in Ann. Bot. Mus. Lugd.-Bat. 1. 139 (1863-64). Erect, 8-24 in. high. Branches densely and retrorsely ochraceo-hirsute, the spiciferous 2 mm. thick; collenchyma continuous, almost entirely libriform; a single central lysigenous canal; sclerosed cells abundant in the pith, less so in the bark. *Leaves* shortly petioled; limb membranous when dry, minutely pellucid-dotted, glabrous above, densely hirsute on the nerves and veins underneath; 11—15 cm. long, 5.5—7 cm. wide; elliptic, acutely acuminate, the base obtuse or subattenuate on one side, rounded and wider on the other side; 7-plinerved, the central nerve emitting 2 opposite or subalternate ascendent nerves, the uppermost from about 5.2 cm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 6—8 mm. long, densely hirsute, sheath basal. *Peduncle* nearly equal to the petiole, densely ochraceo-hirsute. *Spike*: ♂ about 20 mm. long, 3 mm. thick, rhachis hirsute; bract glabrous, its limb orbicular, 1 mm. in diam. with a central pedicel; stamens 2, anthers oblong, 4-valvate, much shorter than the oblong filaments: androgynous spike cylindric, about 10 mm. long, white when living, rhachis hirsute; bract glabrous, subobovate-orbicular with a central pedicel; stamens as above; ovary free, glabrous; stigmas 3, ovate. *Berry* ovate, with a rather long conical style. C. DC. in Prodr. XVI. 1. 344. *P. rostratum*, Hook f. Fl. Br. Ind. V. 87 (not Roxb.). *P. birmanicum*, C. DC. in Prodr. XVI. i. 338.

DINDINGS: Gunong Tungul, *Ridley*. PERAK: Larut Hills Tea Gardens, *Curtis* 2049; Maxwell's Hill, *Ridley*; Gunong Batu Putih, alt. 4500 ft., Wray 283; at Kwala Wok, Wray 864; at Larut, *King's Collector*, 2491; in dense jungle, rich soil, 300—500 ft., 7791; *Scor-*

*techini*; Goping, *King's Collector* 415; Kampong Simpai, Batu Pahat, Lake and Kelsall 4015. SELANGOR: Gua Batu, Kajang, Kwala Lumpur, Ridley.—DISTRIB: Sumatra, Borneo.

8. *PIPER FLAVIBACCUM*, C. DC. in Records Bot. Surv. Ind. VI. 5 (1912). Branches glabrous, pale brown when dry, the spiciferous about 1 mm. thick; collenchyma continuous, sparsely libriform; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous, limb rigid, membranous when dry, copiously pellucid-dotted; 10–11 cm. long, 2.8–3.5 cm. wide; oblong-ovate, acutely attenuate, the base inequilateral, attenuate on the shorter, rounded and wider on the longer side; 4-nerved, 2 lateral ascending nerves on one side of the base and a single on the other; petiole 10 mm. long with basal sheath. *Peduncle* glabrous, slender, nearly 20 mm. long. *Spike*: ♂ about 22 mm. long when flowering; rhachis hirsute; bract glabrous, its limb round, 0.5 mm. in diam. with a central short pedicel; stamens 2, anthers rounded, 4-valvate, much shorter than the oblong filaments: ♀ 20 mm. long when ripe. *Berry* free, globose, bright yellow when living, brown when dry, 2 mm. in diam.

PERAK: *Scortechini*; summit of Gunong Batu Putih, alt. 6700 ft., Wray 271, 331.

9. *PIPER MINIATUM* Bl. in Verh. Bat. Genoots. XI. 166 (1826) and Enum. Pl. Jav. 1. 65. Slender creeper, up to 6 m. long. Branches glabrous drying brown, the spiciferous nearly 1 mm. thick; collenchyma in distinct bundles, nearly entirely libriform; a single central lysigenous canal. *Leaves* very shortly petioled; limb rigid-membranous when dry, very minutely pellucid-dotted, 8–18 cm. long, 4–9 cm. wide, shining above, glabrous on both surfaces except at the base where the nerves are at first hirsute and soon glabrous; oblong-ovate, acutely acuminate, slightly inequilateral and very shortly half cordulate at the extreme base the longer side of which is auriculate; 5–7-nerved; petiole hirsute especially at the margins, about 4 mm. long, sheath basal. *Peduncle* glabrous, 26 mm. long, slender. *Spike*: ♂ 10.5 cm. long, up to 7 mm. thick, rhachis hirsute; bract glabrous, its limb round, 0.5 mm. in diam. with a central rather long pedicel; stamens 3, anthers elliptic, 2-valvate, filaments very short: ♀ 10.5–18 cm. long, 4 mm. thick, densely bacciferous, rhachis and bract as in the male; ovary free, glabrous, oblong; stigmas 3, very minute. *Berry* oblong-obovate, angulose, 2 mm. long, bright red when living, black when dry. C. DC. in Prodr. XVI. i. 354;

Hook. f. Fl. Br. Ind. V. 85. *P. auriculatum*, Bl. l. c. 171, Enum. 66. *P. glandulosum*, Opiz in Presl Reliq. Haenk. 158. *P. lanceolatum*, Roxb. Fl. Ind. 1. 159. *P. moluccanum*, Spreng. Syst. Veg. 1. 112. *Chavica miniata*, *macrostachya*, *lanceolata*, Miq. Syst. Pip. 234, 236, 264; Ill. Pip. 32, 33, t.t. 28, 29 and Fl. Ind. Bat. 1. ii. 440, 445.

PENANG: Wallich 6644; between rocks at 500 ft. altitude, *King's Collector* 1533; on rocks and trees, *Curtis*. PERAK: Waterfall, *Curtis* 2290; at 300 ft. altitude, *Wray* 1959; Larut, clings to trees in dense jungle, *King's Collector* 748; at 300-600 ft. in open jungle on trees in rocky localities, *Kunstler* 1925. MALACCA: Maingay K.D. 1327; at Bukit Benang, *Derry* 535, on Mt. Ophir, *Derry* 3152. Johore: Tanjong Kupang, *Ridley* 6426. SINGAPORE: at Toas, *Ridley* 4684.

10. *PIPER SEMANGKOANUM*, C. DC. in Records Bot. Surv. Ind. VI. 6 (1912). Glabrous in all its parts, spiciferous branches 1.5 mm. thick; collenchyma in distinct bundles, sparsely libriform; a central lysigenous canal; abundant blackish cells in the pith. *Leaves* shortly petioled; limb membranous when dry, 11.5 cm. long, 5 cm. wide; ovate, acutely acuminate, the base rounded and equilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves from nearly 42 mm. above the base and having on each side of it 2 ascendent nerves free from the base; petiole 5 mm. long, sheath basal. *Peduncle* as long as the petioles. *Spike*: ♀ cylindric, black when dry, 8.5 mm. long, about 2 mm. thick; bract orbicular, subsessile at its centre; ovary free, stigmas 4, linear.

PERAK: Maxwell's Hill, *Ridley*. SELANGOR: Semangko pass, *Ridley*.

11. *PIPER GYMNOCLADUM*, C. DC. in Records Bot. Surv. Ind. VI. 6 (1912). Glabrous in all its parts; branches drying brown, the spiciferous up to 1.5 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. *Leaves* shortly petioled; limb firmly membranous when dry, up to 14.5 cm. long and 6.5 cm. wide, pellucid-dotted, ovate, shortly and acutely attenuate, the base rounded and inequilateral, wider and slightly longer on one side; 7-plinerved, the central nerve emitting on each side 2 ascendent nerves, the uppermost from 12.5 mm. above the base, and having on each side of it one subascendent short and thin nerve free from the base; petiole 10 mm. long, of which 2 mm. between the sides of the limb. *Peduncle* up to 22 mm. long. *Spike*: ♀ 16.8 mm. long,

2.1 mm. thick when flowering; bract rounded, 0.52 mm. in diam. with a short central pedicel; ovary free; stigmas 3-4, ovate-oblong, acute at the top. *Berry* sessile, globose, nearly 3 mm. in diam.

PERAK: Maxwell's hill, *Ridley* 5479.

12. PIPER BOEHMERIAEFOLIUM, Wall. Cat. 6654 (1828); C. DC., in Prodr. XVI. i. 348; Hook. f. Fl. Br. Ind. V. 85. *Chavica boehmeriaefolia*, Miq. Syst. Pip. 265; Ill. Pip. 41, t. 37.

Forma *b*, *glabrifolia*, C. DC. n.f. Erect, 0.9-1.2 m. high; branches glabrous, brown when dry, the spiciferous nearly 2 mm. thick; collenchyma continuous, not libriform; no lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, up to 18.8 cm. long and 7.5 cm. wide, oblong-elliptic, acutely acuminate, the base inequilateral, rounded on the longest attenuate on the shortest side; penninerved, the central nerve emitting 5 nerves on the longest and 4 on the other side, the uppermost from 5 cm. above the base, the superior ascendent, the inferior subascendent and more curved; petiole about 6.5 mm. long, of which 2.2-4.4 mm. between the sides of the limb, sheath basal. *Peduncle* 4.4 mm. long, glabrous. *Spike*: ♂ about 28 mm. long, light yellow when flowering, later yellowish-red, rhachis hirsute; bract glabrous, its limb round, little less than 2.2 mm. in diam. with a short central pedicel; stamens 3, anthers reniform, 4-valvate, much shorter than the oblong filaments.

PERAK: Larut, at 500-1500 ft. altitude, in dense old jungle on rocky rich soil, *Kunstler* 2231, 2517.

*Var. lanata*, Hook. f. Fl. Br. Ind. l.c. *P. lanatum* Roxb. Fl. Ind. 1. 159, Ed. Carey and Wall. 1. 161; Wall. Cat. 6647; C. DC. in Prodr. 1. 341. *P. Cubeba*, Wall. Cat. 6645 (not Linn.). *P. lonchites*, Wall. Cat. 6644 in part. *P. javanicum*, C. DC. l.c. 343. *Cubeba lanata*, Miq. Syst. Pip. 298; Fl. Ind. Bat. 1. 2. 450. *C. Lowong* var. *quintuplinervis*, Miq. l.c. 298.

Ramlets densely hirsute: structure as in the type except that there are a few sclerosed cells opposite the medullary rays; limb 11-12 cm. long, 3.5-4 cm. wide, the upper surface hirsute principally on the nerves, undersurface and petiole densely hirsute. *Peduncle* up to 2 cm. long.

PENANG: *Wallich* 6647.

*Var. glabra*, Hook. f. l.c.; ramlets and leaves quite glabrous. Limb lanceolate, 4-5 in. long, up to 2 in. wide.

PAHANG: Tahan river, *Ridley* 2259, 2260; Ayer Panas, *Derry* 497. PERAK: in dense jungle, clinging to stems of trees, alt. 200-300 ft., *King's Collector* 4184; a small pepper 4-5 ft. long, fruit bright red when ripe, *Kunstler* 3411. PROV. WELLESLEY: at 100-300 ft. altitude, a long slender pepper, in dense jungle on trees, fruit red, *Kunstler* 1613; *Ridley* 14496.

*Var. humilis* C. DC. n. var.; shrub about 60 cm. high. Ramlets glabrous, petioles hirtellous; limb of leaves glabrous. *Berry* globose, nearly 1 mm. in diam.

PERAK: *Wray* 1949; *Scortechini*.

*Var. angustifolia*, Miq. ex Hook. f. l.c.; ramlets and leaves glabrous, lanceolate, 38-42 mm. long, up to 12.5 mm. wide.

MALACCA: *Maingay* K.D. 1333.

13. PIPER LONCHITES, Wall. Cat. 6644 (1828). Erect? Branches glabrous, smooth, drying brown, the spiciferous 1 mm. thick; collenchyma libriform in distinct bundles; a central and several peripheric lysigenous canals. *Leaves* shortly petioled, glabrous; limb membranous when dry, copiously and minutely pellucid-dotted, 7.6 cm. long and nearly 31 mm. wide, ovate-lanceolate, acutely attenuate, the base very slightly inequilateral, acute on the shortest, subrounded on the longest sides; 5-plinerved, the central nerve emitting 2 opposite ascendent nerves from nearly 6.3 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole 3.3 mm. long, sheath basal. *Peduncle* glabrous, very slender, 13.5 mm. long in the male, 19-25 mm. long in the female. *Spike*: ♂ about 12.5 mm. long when flowering; rhachis hirsute; bract glabrous, rounded, subsessile at its centre, 1 mm. in diam.; stamens 3, anthers ovate, 4-valvate, shorter than the adult, oblong, filaments: ♀ about 29.5 mm. long and 2.5 mm. thick; rhachis and bract as in the male; ovary free, stigmas 3-4, lanceolate. Miq. Syst. Pip. I. 331; C. DC. in Prodr. XVI. i. 358; Hook f. Fl. Br. Ind. V. 40; non Röm. & Sch. Syst. Mant. 1, 241 quod = *P. lanceolatum*, Roxb. = *P. miniatum*, Bl.

PENANG: *Wallich*. PERAK: *Scortechini*.

Forma *b*, C. DC. n.f. Branches as in the type; collenchyma almost entirely libriform, a single central lysigenous canal, a zone of sclerosed cells between the masses of phloem of the peripheric fibro-vascular bundles. Limb rigid when dry, the base slightly inequilateral, acute on both sides.



PENANG: *Hook. f. and Thoms.* PERAK: *Scortechini*.

Forma c, C. DC. n.f. *P. khasianum*, C. DC. in *Prodr.* XVI. i.

349. Branches slightly costellate; collenchyma libriform, in distinct bundles, a single central lysigenous canal, no sclerous cells.

PERAK: erect, *Ridley* 14497; *Scortechini* 619.

14. *PIPER GYMNOPHYLLUM*, C. DC. in *Records Bot. Surv. Ind.* VI. 6 (1912). Branches glabrous, dark brown and black-dotted when dry, the spiciferous up to 2 mm. thick; collenchyma partly or quite libriform in distinct bundles. *Leaves* moderately long petioled, glabrous; limb membranous when dry, black-dotted underneath, up to 16 cm. long and 5.5 cm wide, elliptic-lanceolate, acutely acuminate at the top, acute and slightly inequilateral at the base; 6-plinerved, the central nerve emitting 3 ascendent nerves of which 2 on one side, the uppermost from nearly 25.5 mm. above the base, and having on each side of it one ascendent short nerve free from the base; petiole up to 10.5 mm. long with basal sheath. *Peduncles* glabrous, 12.5 mm. long. *Spike*: ♀ nearly half as long as the limb; rhachis fulvescent-hirsute; bract glabrous, rounded, 1.5 mm. in diam., subsessile at its centre; ovary free, ovate, glabrous, stigmas 3-4, linear. *Berry* ovate, 4.2 mm. long, black when dry.

PERAK: Bujong Malacca, *Ridley* 9527.

Perhaps ♀ of *P. eucalyptolimbum*.

15. *PIPER PUBERULIRAMEUM*, C. DC. in *Records Bot. Surv. Ind.* VI. 7 (1912). Branches sparingly puberulous, drying brown, the spiciferous 1 mm. thick; collenchyma libriform in distinct bundles; a single central lysigenous canal. *Leaves* shortly petioled; limb rigid when dry, copiously pellucid-dotted, 7.5—8.5 cm. long and 2.5 cm. wide, glabrous on both surfaces, ovate-lanceolate, acutely attenuate, the extreme base acute and slightly inequilateral; 5-plinerved, the central nerve emitting 2 ascendent opposite nerves 8.5—10.5 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole puberulous, 8.4 mm. long, of which less than 1 mm. between the sides of the limb, sheath basal. *Peduncles* slender, glabrous, 19 mm. long. *Spike*: ♀ about 3.5 cm. long when fruiting, rhachis densely hirsute; bract glabrous, its limb round, 1.5 mm. in diam., sessile at its centre; ovary free, glabrous; stigmas mostly 4, rounded and short. *Berry* sessile, globose-ovate, nearly 4.2 mm. long, drying black.



PENANG: Government hill, at 2000 ft. altitude, April, *Curtis* 2291; Balik Pulau, March, 8026. SUNGEI UJONG: *Curtis* 2083.

16. *PIPER VELUTINERVIVM*, C. DC. in *Records Bot. Surv. Ind.* VI. 7 (1912). Stem 0.9—2.4 m. high, its lower portion rooting from the nodes; spiciferous branches fulvescent-hirsute when young especially in the male, 4.2 mm. thick; collenchyma libriform in the male and not so in the female, in distinct laterally widened bundles; a single central lysigenous canal. *Leaves* long petioled; limb membranous when dry, copiously pellucid-dotted, glabrous above, velvety-hirtellous underneath on the nerves and veins; up to 22 cm. long and 21 cm. wide; rounded-ovate, acutely acuminate, the base equilateral and deeply cordate; 11-plinerved, the central nerve emitting 2 opposite ascendent nerves from nearly 6.3 mm. above the base, and having on each side of it 5 nerves free and divergent from the base; petiole fulvescent-hirsute and more densely so in the male, 11.5 mm. long, sheath prolonged up to 17 mm. above the base; stipules glabrous. *Peduncle* up to 16.8 mm. long, fulvescent-hirsute in the male, nearly glabrous in the female. *Spike*: ♂ 3.8 cm. long, 4.2 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, 1 mm. in diam. with a central pedicel; stamens 2, anthers subglobose, 4-valvate, much shorter than the oblong and exsert filaments: ♀ up to 5.7 cm. long and 5.2 mm. thick; rhachis hirsute; bract rounded, 1.5 mm. in diam. with a central pedicel; ovary free, ovate, glabrous; stigmas 3, more rarely 4, ovate-oblong. *Berry* sessile, ovate-globose, yellow-red when living, black when dry, 4.2 mm. long.

PERAK: Larut, at 1800-2000 ft. altitude, in open jungle between rocks, August, *King's Collector* 2193, 2196.—DISTRIB. Sumatra.

17. *PIPER SARMENTOSUM*, Roxb. *Fl. Ind. Ed. Car. & Wall.* I. 162 (1820). Erect, 15—45 cm. high, "ramous at top, jointed and smooth, sarmentose shoots issuing in abundance from the top of the root and the lower part of the stem, by which the plant is quickly propagated to any extent" (Roxb. l. c.). Branches minutely puberulous, the spiciferous nearly 1 mm. thick; collenchyma not libriform, in distinct bundles; a single central lysigenous canal. *Leaves* moderately long petioled; limb membranous when dry, minutely pellucid-dotted, about 9 cm. long, and 4.2 cm. wide, glabrous above, minutely puberulous underneath on the nerves, ovate, acutely acuminate, the base rounded, equilateral or very nearly so; 7-plinerved, the central nerve emitting 2 ascendent nerves, the

uppermost from about 8.5 mm. above the base, and having on each side of it 2 nerves from the base, the inner ascendent, the outer sub-ascendent and much shorter than the others; petiole minutely puberulous, 6.3 mm. long, sheath basal. *Peduncle* very minutely puberulous, slender, up to 7.5 mm. long. *Spike*: ♂ about 25 mm. long, 2.5 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, 0.5 mm. in diam. with a central pedicel: ♀ about 16.8 mm. long and 6.3 mm. wide when ripe; rhachis and bract as in the male; ovaries free and very densely condensed, glabrous; stigmas 3, ovate. *Berry* globose, sessile, black when dry, nearly 1 mm. in diam. Spreng. Syst. I. 117; Herb. Willd. n. 682; C. DC. in Prodr. XVI. i. 352. *Chavica sarmentosa*, Miq. Syst. Pip. 242, in Hook. Lond. Journ. Bot. IV. 433, in Fl. Ind. Bat. I. 2. 441, in Suppl. (Sumatra) 186, 473, in Pl. Jungh. I. 16, in Linn. XXI. 482; Wight Ic. t. 1929. *Peperomia sarmentosa*, A. Dietr. Sp. I. 161.

PENANG: Wallich. SINGAPORE: roadsides and hedges, *Deschamps*; damp and shady places, *Kunstler* 212.—DISTRIB.: Java, Borneo, Philippine Islands.

18. PIPER SCORTECHINII, C. DC. in Records Bot. Surv. Ind. VI. 8 (1912). Slender creeper, 4.5–6 m. long; branches glabrous, dark brown when dry, the spiciferous 1–1.5 mm. thick; collenchyma not libriform or partly so, in distinct laterally widened bundles; no peripheral lysigenous canal: many rubescent cells in bark. *Leaves* shortly petioled, glabrous; limb membranous when dry, copiously and minutely pellucid-dotted, 12–15.5 cm. long, 3.6–4.8 cm. wide; oblong-elliptic-lanceolate, acutely acuminate, the base attenuate, its sides unequally long in the male, of same length in the female; penninerved, the central nerve emitting from nearly half of its length 7 ascendent nerves of which 3 on the shortest 4 on the longest side of the limb; petiole up to 12.6 mm. long of which 2.1–4.2 mm. between the sides of the limb; sheath prolonged a little above the base of the petiole. *Peduncle* glabrous, slender, 14.7–25.2 mm. long. *Spike*: ♂ 6.5 cm. long, nearly 1 mm. thick when flowering; rhachis hirsute; bract glabrous, rounded-subobovate; stamens 2, anthers elliptic, 2-valvate, filaments very short: ♀ about 7.6–15.6 cm. long when ripe; rhachis and bract as in the male; ovary free, glabrous, ovate; stigmas 3, linear. *Berry* sessile, subobovate-globose, shortly mucronate, 4.2 mm. long, black when dry.

PERAK: on Maxwell's hill, at 3000 ft. altitude, March, *Scorte-*

*chini* 285; Larut at 2800-3000 ft. altitude, August, *King's Collector*, 3230; on limestone hills at Goping 300—500 ft. altitude, 5906.

19. *PIPER LONGUM*, Linn. Sp. Pl. 29 (1753) (*exclus.* Syn. Rumph.). Creeping below, flowering shoots erect. Branches glabrous, pale brown when dry, the spiciferous 1 mm. thick; collenchyma in distinct bundles, libriform in its inner zones; a single central lysigenous canal. *Leaves* shortly petioled; limb membranous when dry, copiously pellucid-dotted, about 6—10 cm. long and 2.5—3.5 cm. wide, glabrous above, minutely pubescent on the nerves underneath; oblong-ovate, acutely acuminate, the base cordate equilateral or slightly wider on one side than on the other; 5—7-nerved, the 3 central nerves stouter than the others; petiole minutely pubescent, about 6 mm. long in the upper leaves, sheath basal. *Peduncle* minutely pubescent, 21—24 mm. long in the male, 12.6—14.6 mm. in the female. *Spike*: ♂ up to 5.5 cm. long and 3 mm. thick; rhachis glabrous; bract glabrous, its limb rounded 1.5 mm. in diam., with a rather long central pedicel; stamens 2, anthers elliptic, filaments short: ♀ about 15 mm. long and up to 4.5 mm. thick when flowering; rhachis and bract as in the male; ovary partly imbedded in the rhachis, its upper portion free and glabrous; stigmas 3, ovate-acute. *Berry* partly imbedded in the rhachis, its upper free portion glabrous and globose, 2 mm. in diam., blackish when dry. *P. longum Pistolochiae* Pluk. Almag. 297, Phyt. t. 104, fig. 4, Herb. Pluk. 97, fol. 105; 'Cattu tirpali,' Rheedee, *Hort. Mal.* VII. 27, t. 14. *P. foliis cordatis petiolatis sessilibusque*, Linn. Fl. Zeyl. 30. *P. longum*, Herb. Burm. 4, fig. 3; Hill Dict. 26, 17. t. 17 fig. 1; Vahl Enum. I. 334; Willd. Sp. Pl. 1. 161; Herb. Willd. n. 698, fol. 1; Roxb. Fl. Ind. I. 156; Lour., Fl. Cochinch. 40; C. DC. in Prodr. XVI. i. 355; Hook. f. Fl. Brit. Ind. V. 83. *Chavica Roxburghii*, Miq. Syst. Pip. 239; Ill. Pip. 35, t. 30; in Hook. Lond. Journ. IV. 433; in Linn. XX. 130; in Fl. Ind. Bat. I. ii. 430; Hayne Arnz. Gewachs. XIV. t. 20.

PENANG: *Curtis* 887; near the bank of Kuila river, *King's Collector* 385. SELANGOR: Langat, *Ridley* 399. PAHANG: Pekan, *Ridley* 1004.—DISTRIB.—India, Malay Archipelago.

20. *PIPER SUBFRAGILE*, C. DC. in Records Bot. Surv. Ind. VI, 9 (1912). Scandent. Branches glabrous, light brown when dry, the spiciferous 0.5 mm. thick; collenchyma in distinct bundles, libriform; a central and several lysigenous canals. *Leaves* shortly

petioled, glabrous; limb subcoriaceous when dry, copiously pellucid-dotted, 5.5 cm. long, 3.6 cm. wide, ovate, shortly and subacutely attenuate, the base rounded, both sides of same width, one slightly longer than the other; 7-plinerved, the central nerve emitting 2 ascendent opposite nerves from nearly 8.4 mm. above the base, and having on each side of it 2 nerves free from the base, the inner ascendent, the outer subascendent; petiole 6.6 mm. long, of which 2.1 between the sides of the limb. *Peduncle* glabrous, 3.3 mm. long when still young. *Spike*: ♀ 10.5 mm. long, 2 mm. thick; rhachis hirsute; limb of bract rounded, glabrous with a central hirsute pedicel; ovary glabrous, its lower portion imbedded in the rhachis:—

PERAK: Kurau, in the plains, May, Wray 4262.

A species very much like *P. fragile*, Bentham, from which it differs by the structure of the branches.

21. *PIPER MINUTISTIGMUM*, C. DC. in Records Bot. Surv. Ind. VI. 9 (1912). A very large pepper, 9—12 m. long. Branchlets glabrous, light brown when dry, the spiciferous up to 3 mm. thick; collenchyma continuous, its inner zone sparingly libriform; no peripheric lysigenous canal; very abundant fuscous cells in bark and pith. *Leaves* moderately long petioled, glabrous; limb rigid when dry, minutely and sparingly pellucid-dotted, 13.5 cm. long, 7 cm. wide; ovate, acutely acuminate, the base rounded, both sides of same width but unequally long; 9-plinerved, the central nerves emitting 2 alternate ascendent nerves, the uppermost from 16.5—19.8 mm. above the base, and having on each side of it 3 nerves free from the base, all nerves prominent underneath; petiole 19 mm. long of which 6.3 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous 5.8—7.7 cm. long. *Spike*: ♀ cylindric about 9 cm. long and nearly 4 mm. thick when ripe; rhachis velutino-puberulous; bract glabrous, its limb ovate-rounded 1.5 mm. long, with a very short and thick pedicel inserted below its centre; ovary deeply imbedded in the rhachis, convex and velutino-puberulous in its upper free portion; stigmas 3 minute. *Berry* subquadrangular at the apex.

PERAK: Larut, September, King's Collector 2388; *Scortechini*.

22. *PIPER BETLE*, Linn. Sp. Pl. Ed. 1, 28 (1753). Scandent. Branches glabrous, brown when dry, the spiciferous 0.5 mm. thick; collenchyma continuous or subcontinuous, partly libriform; a central and several peripheric lysigenous canals, abundant brown cells in bark and pith. *Leaves* glabrous; limb membranous when dry,

very minutely pellucid-dotted, 10—13 cm. long, 45—90 mm. wide; ovate or rounded-ovate, acutely acuminate, the base equilateral, rounded or more or less cordate in the inferior leaves, 5-plex—9-plex-nerved, the central nerve emitting on each side 1—2 ascendent nerves, the uppermost from about 20 mm. above the base, and having on each side 1—2 nerves free from the base, the external less ascendent and much thinner than the others; petiole 15—35 mm. long with a sheath prolonged up to  $\frac{1}{4}$ — $\frac{1}{2}$  of its length. *Peduncle* glabrous, as long as the petiole in the male and longer than it in the female. *Spike*: ♂ nearly as long as the limb; rhachis tomentose; bract glabrous, its limb rounded or obovate, sessile at its centre; anthers elliptic, 4-valvate; filaments short, of same width as the anthers: ♀ about 5 cm. long and 10 mm. thick when ripe; rhachis tomentose; bract as in the male; base of the ovary imbedded in the rhachis, stigmas 4—5, lanceolate; *Berry* convex and tomentose in the upper part.

Vahl Enum. I. 328; Willd. Sp. Pl. I. 159; Roxb. Fl. Ind. Ed. Car. & Wall. I. 160; C. DC. in. Prodr. XVI. i. 359; Hook. f. Fl. Br. Ind. V. 85 (excluding Ic. Wight and Syn. *Ch. Chuvya*, Miq.); Bot. Mag. t. 3132 (excluding fruit analysis). *Chavica Belle*, Miq. Syst. Pip. 186. *Ch. auriculata*, Miq. Syst. 269. *Aetnanthe hexagyna*, Miq. Syst. Pip. 412.

Cultivated in the hotter and damper parts of India, Ceylon, the Malay Peninsula, Andamans and Nicobar Islands, Oceania.

Forma *b*, C. DC. in Philipp. Journ. Sc. V. 431. *P. Belle* var. *γ densum* in C. DC. Prodr. l.c. 360; limb more ovate and less equilateral at the base.

PENANG: Balik Pulau, *Ridley* 8029. PERAK: Waterloo, at 1500 ft. altitude, *Curtis* 2701. SELANGOR: Kwala Lumpur, *Curtis* 2368, 2369. SINGAPORE: Vern. "Sirih Batek," *Ridley* 4684.—DISTRIB.: ANDAMANS: *King's Coll.* 322. NICOBARS: *Kurz*.

23. PIPER FEBRIFUGUM, C. DC. in Records Bot. Surv. Ind. VI. 10 (1912). Scandent. Branches densely fulvescent-villose, the spiciferous 4 mm. thick; collenchyma continuous and libriform; no peripheric lysigenous canal, or zone of globose sclerous cells between the collenchyma and the peripheric fibrovascular bundles. *Leaves* shortly petioled; limb firmo-membranaceous when dry, nearly 22.5 cm. long and 13 cm. wide; glabrous above, shortly and rather densely hirsute underneath; ovate, acutely acuminate, the base cordate with round unequally long and wide lobes inserted at the same level on the

petiole; 13-plinerved, the central nerve emitting 3 pairs of opposite ascendent nerves, the uppermost from nearly 9 cm. above the base, and having on each side of it 3 divergent nerves free from the base; petioles 10 mm. long, densely villous. *Peduncle* minutely puberulous, 45 mm. long. *Spike*: ♀ about 16·5 cm. long, 3·5 mm. thick when flowering; rhachis hirsute; bract glabrous, its limb round with a short central and thick pedicel; ovary half imbedded in the rhachis, umbonate and glabrous above; stigmas 3, ovate-acute. *Berry* black when dry.

SUNGEI UJONG: Vern. "Akar Sangkap," *Cantley* 1867.

The roots when boiled are given in cases of fever.

24. *PIPER PORPHYROPHYLLUM*, N. E. Brown in Gard. Chron. (1884) XXII. 438. Scandent. Branches glabrous, the spiciferous 0·5 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, marble pink underneath when living, nearly 10·5 cm. long and 4·5 cm. wide, elliptic, shortly and acutely acuminate, the base acute and shortly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from nearly 2·5 cm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 8·5 mm. long of which 1 mm. between the sides of the base. *Peduncle* up to 17 mm. long, glabrous. *Spike*: ♂ a little longer than the limb, rhachis hirsute; bract glabrous, oblong, adnate, free at the margin, rounded at both ends; stamens 3, anthers small obovate, filaments very slender: ♀ up to twice as long as the limb, rhachis and bract as in the male; ovary free, glabrous, stigmas 4 linear. *Berry* ovate, attenuate at the apex, 5 mm. long, reddish-black and longitudinally wrinkled when dry. *P. nigrum*?, Wall. Cat. 6643 E, F. ex Hook. f. in Fl. Br. Ind. V. 96. *Cissus*? *porphyrophyllus*, Lindl. in Journ. Hort. Soc. I. 225 and Fl. des Serres Ser. 2, IV. t. 1491 (a sterile specimen).

PERAK: Hijau range, *Curtis* 2048. DINDINGS: *Ridley* 3035. Malacca, Singapore and Penang, *Wallich* 6643.

Found in the whole Peninsula from Tringganu to Singapore.

25. *PIPER NIGRUM*, Linn. Sp. Pl. Ed. 1, 28 (1753). Climbing, quite glabrous. Branches terete, the spiciferous 2—3 mm. thick; collenchyma libriform, continuous, in a thin layer; a central and many peripheric lysigenous canals. *Leaves* moderately long petioled; limb coriaceous, more or less glaucous underneath, minutely pellucid-



dotted, 11—15 cm. long, 5—9 cm. wide, a little narrower on one side of the central nerve than on the other side; ovate-elliptic, acutely acuminate, the base subattenuate and equilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from about 35 mm. above the base, and having on each side of it 2 ascendent nerves free from the base, the outer much shorter and less ascendent than the others; petiole 2—3 cm. long, with sheath prolonged up to its middle or a little higher. *Peduncle* nearly as long as the petiole. *Spike* about as long as the limb; bracts linear-oblong, adnate to the rhachis and free from it only at the margins, the lower end obtuse, the upper more rounded; flowers commonly unisexual and dioecious, more rarely bisexual, surrounded by a sort of calicule formed by the ends of the adjacent bracts; stamens 2, anthers rounded-reniform much shorter than the fleshy filaments; ovary free, rounded, stigmas 3—4, rarely 5, lanceolate. *Berry* sessile, globose, red when fresh, drying black, 3—4 mm. in diam. Vahl Enum. I. 329; Roxb. Fl. Ind. I. 150 and Ed. Carey & Wall. I. 153; Blume in Verh. Bat. Genoots. XI. 191, f. 11—17; Miq. Syst. Pip. 308, Ill. Pip. 50, t. 50; C. DC. in Prodr. XVI. i. 363; Hook. f. Fl. Br. Ind. V. 90; Hayne Arnz. Gewachs. XIV. t. 6; Bot. Mag. t. 3139; Schitzl. Icon. II. t. 81.

Cultivated in the damp parts of India, Ceylon, the Malay Archipelago and most other tropical countries.

Var. *subpenninervis* C. DC. *n. var.*, limb elliptic-lanceolate 17.5 cm. long, 7.5 cm. wide, acutely and rather long acuminate, the base equilateral, acute, the central nerve emitting 4 ascendent nerves, the uppermost from nearly 6 cm. above the base, and having on each side of it one ascendent nerve free from the base; flowers bisexual, stamens 3. *Berry* elliptic-globose, attenuate and acute at the apex, 4 mm. long.

DINDINGS: Gunong Tungul, *Ridley* 8018. PERAK: *Ridley* 8027, 8382; Waterloo, *Curtis* 2700. SELANGOR: high cave Gua Batu, *Curtis* 8180.—DISTRIB.: Tenasserim, *Helfer* 4425.

26. *PIPER FLAVISPICUM*, C. DC. in Records Bot. Surv. Ind. VI. 10 (1912). Erect, 2 feet high. Branches glabrous, the spiciferous about 1.5 mm. thick; collenchyma libriform, in distinct and rather thick bundles; a single central lysigenous canal. *Leaves* very shortly petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, 13—15 cm. long and 4.5—5.5 cm. wide, elliptic-lanceolate, rather long acuminate, the base acute and equilateral; 7-plinerved, the central nerve emitting 2 alternate ascendent nerves, the upper-

most from nearly 4 cm. above the base, and having on each side of it 2 lateral ascendent nerves free from the base, the external much shorter and thinner than the others; petiole 4 mm. long with basal sheath. *Peduncle* glabrous, 6.3 mm. long. *Spike*: ♂ 5.6 cm. long, 1 mm. thick, rhachis glabrous; bract glabrous, its limb oblong-obovate, 2.5 mm. long, up to 1.5 mm. wide; stamens 3, anthers ovate, 4-valvate, nearly as long as the oblong filaments: ♀ 5.6 cm. long and yellow when ripe; bract as in the male. *Berry* free, ovate, 4 mm. long, drying black.

PERAK: Sunga Prya, near a small limestone hill in dense jungle, *King's Collector* 1004.

27. *PIPER LONGICAULE*, C. DC. in Records Bot. Surv. Ind. VI. 11 (1912). Climber, 6—7 cm. long, clinging to trees and shrubs. Branches glabrous, light brown when dry, the spiciferous 1 mm. thick; collenchyma libriform, in distinct thin bundles; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb rigid-membranous when dry, minutely and inconspicuously pellucid-dotted; 7.5—10 cm. long, 3.5—4 cm. wide, elliptic-lanceolate, acutely acuminate, the base subacute and slightly longer on one side than on the other; 7-plinerved, the central nerve emitting 2 alternate ascendent nerves, the uppermost from 12—14 mm. above the base, and having on each side of it 2 ascendent nerves free from the base, the external much thinner and shorter than the others; petiole nearly 7 mm. long, sheath basal. *Peduncle* glabrous, about 12 mm. long, 0.5 mm. thick. *Spike*: ♂ nearly 8 cm. long and 1 mm. thick; flowers almost verticillate; rhachis hirsute; bract adnate, obovate-oblong, 1.5 mm. long, obtuse at the lower end, rounded or shortly attenuate at the apex, minutely puberulous on the back and ciliolate at the free margins; stamens 3, anthers obovate, 4-valvate, little longer than the oblong filaments: ♀ up to 19.5 cm. long, white on the living plant when flowering; rhachis hirsute 1.5 mm. thick; bract 2.5 mm. long, otherwise as in the male; ovary free, glabrous; stigmas 4—5, linear, acute, recurved. *Berry* ovate, subacute at the apex, nearly 2.5 mm. long, yellow or red when living, brown when dry.

PENANG: *Curtis* 1318. PERAK: Ulu Slim at 500—800 ft. altitude, in dense jungle and on rocky soil, *King's Collector* 10673; *Scortechini*; Larut, at 1000—3000 ft. altitude, *King's Collector* 2545; 4048, 5876; Kota, Larut, in plains, August, *Wray* 2857; Tapa 1347. MALACCA: *Mairgay* K.D. 1335.—DISTRIB. INDIA, *Wight* 2556.

28. *PIPER KOTANUM*, C. DC. in Records Bot. Surv. Ind. VI. 11 (1912). Branches glabrous, blackish when dry, the spiciferous 1 mm. thick; collenchyma libriform, continuous; a single central lysigenous canal. *Leaves* shortly petioled; limb rigid-membranous when dry, minutely pellucid-dotted; up to 12 cm. long and 5 cm. wide; glabrous above, velutino-puberulous underneath; elliptic, acutely acuminate, the base slightly inequilateral, acute on the shortest, rounded on the longest side; penninerved, the central nerve emitting on each side 3 ascendent nerves, the uppermost from 31·5—37·5 mm., the lowest from a little above the base; petiole glabrous, up to 8·5 mm. long. *Spike*: ♀ 6·4 cm. long, 1 mm. thick; rhachis glabrous; bract glabrous, elliptic, adnate to the rhachis and free only at the margins, a little over 1 mm. long and 0·25 mm. wide; ovary free; stigmas 3, triangular, acute at the apex. *Berry* globose, nearly 3 mm. in diam., black when dry.

PERAK: Kota, in the plains, Wray 1947.

29. *PIPER LEPTONEMA*, Hook. f. Fl. Br. Ind. V. 91 (1885) *excl. specimens of Zollinger*. Scandent. Branches glabrous, drying brown, the spiciferous 1 mm. thick, in those 2 mm. thick collenchyma libriform in distinct thin and laterally widened bundles; a single central lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, about 10·5 cm. long and 4·5—6·5 cm. wide in the male, 7·6—10 cm. long and 4·4—5 cm. wide in the female; elliptic, acutely acuminate, the base rounded and nearly equilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 12·5—14·7 mm. above the base and having on each side of it 2 nerves free from the base, the inner ascendent, the outer subascendent, much shorter and thinner than the others; petiole 8·5—12·5 mm. long, sheath basal. *Peduncle* glabrous, very slender, 12·6—14·7 mm. long. *Spike*: ♂ nearly 9 cm. long, flowers obliquely verticillate; rhachis hirsute with no lysigenous canal; bracts oblong, rounded at both ends, adnate, very tightly condensed, raised but not thinned at the lateral margins, free only at the ends, very minutely puberulous and ciliate, the adnate surface containing large lysigenous cells; stamens 3, anthers exsert, obovate-elliptic, 4-valvate, shorter than the oblong filaments: ♀ nearly up to 13 cm. long, rhachis and bract as above, ovary glabrous, ovate, prolonged at the apex into a short and thick style, stigmas 4—5, oblong, subulate at the top. *Berry* sessile, oblong-ovate, with a short and thick style, 4·2 mm. long, black when dry.

PERAK: Larut at 1200 ft. altitude, November, *Kunstler* 2557; in dense jungle, rocky soil, at 600—800 ft. altitude, a long creeper over 50 feet long, *King's Collector* 1067, male specimens; *Wallich*, female specimen in Herb. Calcutta.

With its bracts the lateral margins of which are not thinned, this species is somewhat intermediate between sections *EUPIPER* and *MULDERA*.

30. *PIPER DINDINGSANUM*, C. DC. in *Records Bot. Surv. Ind.* VI. 12 (1912). Branches glabrous, the spiciferous 2 mm. thick; collenchyma nearly continuous and partly libriform; a central and several peripheric lysigenous canals. *Leaves* moderately long petioled, glabrous; limb membranous when dry, up to 12.5 cm. long and 6.5 cm. wide, ovate, acutely acuminate, the base equilateral and rounded or repand subcordate; 7-plinerved, the central nerve emitting 2 opposite ascendent nerves from about 10 mm. above the base, and having on each side of it 2 subascendent nerves from the base, the external much thinner than the others; petiole 10 mm. long with a basal sheath. *Peduncle* 14.7 mm. long, glabrous. *Spike*: ♀ 16.8 mm. long when ripe, rhachis hirtillous; bract glabrous, its limb rounded, 1 mm. wide with a central moderately long pedicel containing gelified cells; ovary free, glabrous, ovate; stigmas 3 linear. *Berry* obovate-globose, 3 mm. long, black when dry.

DINDINGS: July, *Ridley* 8370.

31. *PIPER CANINUM*, Blume in *Verh. Batav. Genoots.* XI. 214, f. 26 (1862). Scandent. Branches glabrous, branchlets brown when dry, shortly hirtillous when young in the male, more densely and longer hirsute in the female, the spiciferous nearly 0.5 mm. long in the male 1 mm. in the female; collenchyma in distinct bundles, its internal zone libriform; a single row of intramedullar bundles; a single central lysigenous canal in the male and a few peripheric in the female; an interfascicular zone of sclerosed cells opposite the medullary rays in the male. *Leaves* shortly petioled; the limb membranous and with pellucid dots when dry, glabrous above more or less pilose underneath; up to 11 cm. long and up to 23 mm. wide in the male and to 4 cm. in the female; ovate-oblong, acutely acuminate, the base equilateral attenuate; 5-plinerved, the central nerve emitting 2 ascendent nerves the uppermost from 10.5 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole slender, up to 10.5 mm. long with basal sheath. *Peduncle* as long as the petiole, puberulous. *Spike*: ♂ many times shorter than

the limbs; rhachis hirsute; limb of the bract rounded, hirtillous above and ciliate with a central short pedicel; stamens 2, anthers globose, 4-valvate: ♀ many times shorter than the limbs; rhachis and bracts as in the male; ovary free, glabrous, stigmas 3—4, ovate, acute. *Berry* ovate-globose, black and 5 mm. long when dry, its stipe nearly of same length. A. Dietr. Sp. Pl. I. 681; C. DC. in Prodr. XVI. i. 341; Hook. f. Fl. Br. Ind. V. 82; C. DC. in Philipp. Journ. Sc. V. 458. *P. Cubeba* Vahl Enum. I. 332; Roxb. Fl. Ind. I. 159 and Ed. Carey & Wall. I. 161; Wall. Cat. 6645. *Cubeba canina*, Miq. Comm. Phyt. 33, t. 3, Syst. Pip. 293, Fl. Ind. Bat. I. ii. 449 and Ann. Mus. Bot. Lugd. Bat.-fasc. V. 137.

PERAK: at Gunong Bintang, *Kunstler* 281; in Upper Perak alt. 300 ft., *Wray* 3606; at Kwala Wok, *Wray* 853; at Bukit Tungul, *Ridley* 3356. SINGAPORE: *Ridley* 4686; at Selitar, *Ridley* 4688; *Ridley* 6425; Tanjong Katong, jungle by road to Siglap, *Ridley*.

32. *PIPER MALACCENSE*, C. DC. in Records Bot. Surv. Ind. VI. 12 (1912). Branches hirsute when young, glabrous afterwards; the spiciferous 1.5 mm. thick; collenchyma continuous, not libriform; a central and many peripheric lysigenous canals. *Leaves* shortly petioled; limb membranous when dry very minutely pellucid-dotted, up to 17.5 cm. long and nearly up to 6 cm. wide, hirsute on both surfaces on the nerves; elliptic-lanceolate, acutely and rather long acuminate, the base slightly inequilateral, acute or rounded on the longer side; penninerved, the central nerve emitting on each side 3 ascendent nerves, the uppermost from about 5.5 cm. above the base; petiole densely hirsute, 7 mm. long, of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* hirsute, nearly as long as the petiole. *Spike* 3 cm. long; rhachis hirsute; bract glabrous, its limb rounded 1.5 mm. in diam.; flowers sometimes bisexual, then stamens 1—2, anthers rounded; ovary free, ovate, glabrous; stigmas 4, linear, acute. *Berry* globose, 3 mm. long, black when dry, much longer than its stipe.

MALACCA: Vern. "Poku Pimpin," *Ridley* 2338; at Merliman, *Ridley* 1617.

33. *PIPER SELANGORENSE*, C. DC. in Records Bot. Surv. Ind. VI. 13 (1912). Scandent. Branches glabrous, slender, the spiciferous 1 mm. thick, greenish when dry; collenchyma in distinct laterally widened bundles, partly libriform; a single central lysigenous canal; many fulvescent cells in pith and bark. *Leaves* shortly petioled,

glabrous; limb rigid-membranous when dry, copiously and minutely reddish-pellucid-dotted, up to 9 cm. long and 4.5 cm. wide, oblong-ovate and subobtusely acuminate, the base rounded, both sides of same length one of them wider than the other; 5-nerved, the central nerve emitting many strong patulous veins and having on each side of it 2 ascendent nerves free from the base, the outer much thinner than the inner; petiole about 6 mm. long. *Peduncle* 12 mm. long, slender, glabrous. *Spike*: ♀ nearly 26 mm. long, rhachis hirtillous; bract glabrous, its limb obovate, 3 mm. long with a thick central pedicel containing gelified cells; ovary free, ovate; stigmas 3, oblong, short and blunt. *Berry* stipitate, black when dry, about 4 mm. long, its stipe 3 mm. long.

SELANGOR: Semangkoh, Sempang Mines, *Ridley* 15565.

34. *PIPER SUBALBICANS*, C. DC. in Records Bot. Surv. Ind. VI. 13 (1912). Branches glabrous, drying brown, the spiciferous 1.5 mm. thick; collenchyma partly libriform in distinct bundles; a single central lysigenous canal; numerous orange-coloured cells in bark and pith. *Leaves* glabrous, moderately long-petioled; limb membranous and pale when dry, whitish underneath when living, up to 12.5 cm. long and 58 mm. wide; oblong-ovate, acutely acuminate, the base slightly inequilateral, rounded on the longest attenuate on the shortest side; 7–9-plinerved, the central nerve emitting on each side 2–3 ascendent nerves, the uppermost from 26–39 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole slender, up to 10 mm. long of which 2 mm. between the sides of the limb, sheath slightly prolonged above the base of the petiole. *Peduncle* very slender, glabrous, about 10–12 mm. long. *Spike*: ♀ nearly 32 mm. long; rhachis hirsute; bract glabrous, obovate, subattenuate towards its lower end, 3 mm. long, up to 1 mm. wide, sessile above its centre; ovary free, glabrous, ovate; stigmas 3, ovate, short. *Berry* elliptic and longer than its stipe while still young, drying black.

PERAK: Gunong Batu Putih, lower camp, at 3400 ft. altitude, *Wray* 448.

35. *PIPER CURTISII*, C. DC. in Records Bot. Surv. Ind. VI. 14 (1912). Slender creeper, 3–4.5 m. long, clinging to the stems of trees. Branches glabrous, the spiciferous up to 1 mm. thick; collenchyma continuous, partly libriform; a single central lysigenous canal; numerous yellow cells in bark and pith. *Leaves* moderately long-petioled,



glabrous ; limb membranous when dry, copiously black-dotted underneath, 9—11.5 cm. long 3.7—4.5 cm. wide, subobovate-elliptic-lanceolate, acutely acuminate, the base equilateral and acute ; 5-plinerved, the central nerve emitting 2 ascendent nerves from about 2 mm. above the base with many spreading veins higher up, and having on each side of it one ascendent nerve free from the base ; petiole very thin, 10 mm. long, sheath basal. *Peduncle* glabrous, very thin, as long as the petiole. *Spike*: ♀ slender, 4 cm. long ; rhachis hirsute ; bract glabrous, its limb elliptic 2 mm. long with a central short and thick pedicel containing gelified cells ; ovary free, glabrous ; stigmas 3—4, ovate-acuminate. *Berry* globose, yellowish-red when living, black when dry, nearly 4 mm. in diam., its stipe a little shorter.

PERAK : at Waterloo in May, *Curtis* 2699 ; at Larut at 2500—3000 ft. altitude, *King's Collector* 6263 ; *Scortechini*. SELANGOR : Kwala Lumpur, *Curtis*. MALACCA : where Vern. "Akar Siri Haton", *Ridley* 2337.

36. *PIPER PAUCISTIGMUM*, C. DC. in Records Bot. Surv. Ind. VI. 14, (1912). Slender creeper ; branches glabrous, the spiciferous nearly 1 mm. thick ; collenchymalibriform in distinct laterally much widened bundles ; a single central lysigenous canal ; numerous yellow cells in bark and pith. *Leaves* moderately long-petioled, glabrous ; limb membranous when dry, copiously blackish-dotted underneath, up to 10.5 cm. long and 32 mm. wide ; oblong-elliptic, acutely acuminate, the base equilateral and acute ; 5-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from about 26 mm. above the base, and having on each side of it one ascendent nerve free from the base ; petiole very slender, 8.4 mm. long, sheath basal. *Peduncle* very slender, as long as the petiole, glabrous. *Spike*: ♀ nearly 4 cm. long ; rhachis puberulous ; bract glabrous, its limb obovate, 1 mm. long and up to 1 mm. wide, with a central short pedicel ; ovary free, glabrous ; stigmas 2 or 3, ovate-acuminate. *Berry* sealing-wax red when living, black when dry, globose, nearly 3 mm. in diam., its stipe shorter.

PERAK : near Ulu Kerling, April, on trees in dense bamboo forest, at 500—700 ft., *King's Collector* 8820 ; *Scortechini*.

37. *PIPER MAXWELLANUM*, C. DC. in Records Bot. Surv. Ind. VI. 15 (1912). Scandent. Branches glabrous, light brown when dry, the spiciferous 2 mm. thick ; collenchyma continuous and libriform ; a single central lysigenous canal ; numerous orange-coloured cells in

bark and pith. *Leaves* moderately long-petioled, glabrous; limb membranous when dry, reddish-dotted underneath, up to 7.5 cm. long and 36 mm. wide; elliptic-lanceolate, acutely acuminate, equilateral and acute at the base; 7-plinerved, the central nerve emitting on each side 2 ascendent nerves, the uppermost from 26 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole slender, 11 mm. long, sheath basal. *Peduncle* glabrous, slender, 8-14 mm. long. *Spike*: ♀ about 36 mm. long, rachis hirtellous; bract glabrous, obovate, 1.5 mm. long and up to 1.5 mm. wide, shortly pedicellate above its centre, the pedicel containing gelified cells; ovary free, ovate, glabrous; stigmas 3, ovate-acute. *Berry* stipitate, globose, transparent and red when living, black when dry, about 4 mm. in diam., the stipe a little shorter.

PERAK: Maxwell's hill, at 2500 ft., Wray 1734.

38. PIPER PEDICELLOSUM, Wall. Cat. 6646 A. (1828). Scandent. Branches glabrous, dark brown when dry, the spiciferous 2 mm. thick; collenchyma libriform in distinct often laterally much widened bundles; a central and one or two peripheric lysigenous canals; sclerosed cells in the bark between the masses of phloem of the peripheric fibro-vascular bundles. *Leaves* shortly petioled, glabrous; limb subcoriaceous when dry, copiously pellucid-dotted, 9 cm. long, 38-44 mm. wide; ovate, obtusely acuminate, the base cordate and slightly inequilateral; 7-9-plinerved, the central nerve emitting on each side 2 pairs of ascendent opposite nerves, the uppermost from only 6 mm. above the base, and having on each side of it 1-2 nerves free from the base, the external more curved and thinner than the others; petiole 6.3 mm. long of which 2 mm. between the sides of the limb. *Peduncle* glabrous, 8-9 mm. long, 4.5 mm. thick. *Spike*: ♀ 2.5-4 cm. long, rachis hirsute; bract puberulous on the back and ciliolate on the margins, adnate above its centre, oblong-obovate, attenuate and subacute toward the lower end; ovary free, ovate, glanduloso-asperulate; stigmas 4 or more rarely 3, ovate oblong and acute. *Berry* globose, yellowish-red when living, black when dry, 5 mm. in diam., its stipe 6 mm. long, very minutely puberulous. C. DC. in Prodr. XVI. i. 343, exclud. spec. *P. Lambertii*; Hook. f. Fl. Br. Ind. V. 81. *Cubeba Neesii*, Miq. Syst. Pip. 292.

PERAK: Larut, at 100 ft. a large pepper 60-100 ft. long clinging to trees, February, *King's Collector* 5571; at alt. 1200-1500 ft., *King's Collector* 10761. MALACCA: at Ayer Panas, November, *Ridley*

1612. SINGAPORE: *Wallich* 6646 A.—DISTRIB. Assam, Andaman Islands.

Forma *b*; limb yellow when dry, uppermost pair of lateral nerves emitted from 26 mm. above the base.

ANDAMANS: Goplakabang, *King's Collector*.

39. *PIPER RIBESIOIDES*, Wall. Pl. As. Rar. I. 79, t. 9 (1830) and Cat. 6637 (1828). Scandent. Branches pale when dry, glabrous, the spiciferous about 4 mm. thick; collenchyma continuous, libriform; a central and several peripheric lysigenous canals. *Leaves* very large, moderately long-petioled, glabrous; limb coriaceous and pale brown when dry, about 25 cm. long, 11 cm. wide; oblong-ovate, acutely acuminate, the base equilateral, deeply cordate; 9—13-plinerved, the central nerve emitting 1—3 ascendent nerves, the uppermost from about 9 cm. above the base, and having on each side of it 3 nerves free from the base; petiole about 4—5 cm. long and 5 mm. thick, sheath basal. *Peduncle* glabrous, about 8.4 mm. long and 2 mm. thick. *Spike*: ♀ 6—8 cm. long; rhachis hirsute; bracts glabrous, adnate, free at the margin, oblong, rounded at both ends; ovary free, ovate-oblong, glabrous; stigmas 3, oblong, acuminate, recurved. *Berry* globose, about 6 mm. long, its stipe nearly of same length. C. DC. in Prodr. XVI. 1. 342; Hook. f. Fl. Br. Ind. V. 81. *Cubeba Wallichii*, Miq. Syst. Pip. 289, Ill. Pip. 47, tab. 46, 47.

KEDAH: Langkawi, Gunong Raya, *Curtis* 2541. PERAK: at 300 ft. altitude, *Wray* 3726; at Batu Togoh, *Wray* 70904; at alt. 200 ft., *Wray* 2184; at Waterfall, Taiping, *Wray* 4244. MALACCA: *Good-enough* 1496.—DISTRIB. Burma, Tenasserim, Andamans.

Forma *b* C. DC. n. f. limb only slightly cordate or rounded at the base, ♀ spikes generally 2 at the top of a branch, one opposite an undeveloped leaf.

PERAK: Larut at 300—600 ft. altitude, *King's Collector* 1942; at Sungei Ryah, *King's Collector* 900; plains, *Wray* 4243. SELANGOR: Camphor forest, Rawang, *Ridley* 7608. MALACCA: *Maingay* K.D. 1331; *Derry* 80, 82.

Forma *c* C. DC. n. f. Limb subobovate-oblong, cordate or rounded at the base. *Peduncle* 4 mm. long and very slender in the male plant. *Spike*: ♂ about 33 mm. long, 1 mm. thick, rhachis hirtillous; bract glabrous, adnate, free at the margin, oblong, rounded at both ends; stamens 2, anthers obovate: ♀ generally solitary. peduncle and rhachis as in the type; bract minutely ciliate at the

margins. *Berry* glossy, bright when young, red when ripe. *Piper sumatranum*, C. DC. in Prodr. XVI. i. 343; Hook. f. Fl. Br. Ind. V. 81. *Cubeba sumatrana*, Miq. Comm. Phyt. 42, tab. V, fig. A, Syst. Pip. 290, Fl. Ind. Bat. I. ii. 448, Suppl. 8.

PENANG: back of west hills, at 500 ft. altitude, *Curtis* 2256. PERAK: Larut, at 500—1000 ft., a large creeper 40—60 ft. long, *King's Collector* 6618; alt. 2000—2500 ft., *King's Collector* 2901; *Scortechini* 165. SINGAPORE: Reservoir Road, *Ridley* 4825.—DISTRIB. Tenasserim, Andaman Islands, Sumatra.

40. *PIPER MUCRONATUM*, C. DC. in Records Bot. Surv. Ind. VI. 15 (1912). Creeper; branches glabrous, drying brown, the spiciferous 1 mm. thick. *Leaves* shortly petioled, glabrous; limb coriaceous when dry, up to about 10.5 cm. long and 4.2 mm. wide; oblong-elliptic, acutely and rather long acuminate, the base equilateral, obtuse; 5-plinerved, the central nerve emitting 2 opposite ascendent nerves from 10 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole 6 mm. long, sheath prolonged nearly up to the middle of the petiole. *Peduncle* glabrous, 6 mm. long. *Spike*: ♀ nearly 21 cm. long; rhachis puberulous; bract glabrous, adnate, linear-oblong, obtuse at both ends. *Berry* glabrous, elliptic, 2 mm. long, attenuate at the top into a style, its stipe 1 mm. long.

SUNGEI UJONG: *Ridley* 2126.

41. *PIPER LONGIBRACTEUM*, C. DC. in Records Bot. Surv. Ind. VI. 16 (1912). Branches glabrous, drying brown, the spiciferous 1.9 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. *Leaves* rather long-petioled, glabrous; limb elliptic-lanceolate, acutely acuminate, the base acute and equilateral, 11.5 cm. long, 5—6 cm. wide; 7-plinerved, the central nerve emitting 2 alternate ascendent nerves, the uppermost from 16 mm. above the base, and having on each side of it 2 ascendent nerves free from the base, the external much thinner and shorter than the others; petiole slender, 12—16 mm. long, sheath basal. *Peduncle* glabrous, slender, 16 mm. long. *Spike*: ♀ 10.5 cm. long; rhachis glabrous, 1 mm. thick; bract glabrous, oblong-obovate, attenuate at the base, nearly 2.2 mm. long, sessile above its middle; ovary free, glabrous; stigmas 4, ovate-acuminate. *Berry* stipitate, elliptic, black when dry, 4 mm. long, its stipe a little shorter.

PERAK: Maxwell's hill, *Wray* 101.

42. *PIPER XANTHOCARPUM*, C. DC. in Records Bot. Surv. Ind. VI. 16 (1912). Scandent. Branches glabrous, drying brown, the spiciferous 1 mm. thick; collenchyma continuous, libriform; a single central lysigenous canal; abundant orange-coloured cells in bark and pith. *Leaves* shortly petioled; limb up to 14.5 cm. long and 6 cm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral acute; glabrous above, puberulous underneath; 7—9-plinerved, the central nerves emitting on each side 1—2 ascendent nerves, the uppermost from 26—39 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole glabrous, nearly 6 mm. long, sheath basal. *Peduncle* glabrous, up to 26 mm. long, slender. *Spike*: ♀ up to 12 cm. long; rhachis hirsute; bract glabrous, its limb oblong, subattenuate towards the lower end, rounded at the top, adnate, free at the margins, about 3 mm. long and up to 1 mm. wide; ovary free, ovate, glabrous; stigmas 3—4, ovate-acuminate. *Berry* globose, nearly 3 mm. in diam., orange coloured when living, black when dry, longer than its stipe.

PERAK: at 1000 ft. altitude, *Wray* 3795

43. *PIPER LABUTANUM*, C. DC. in Records Bot. Surv. Ind. VI. 16 (1912). Growing on the stems of large trees, 3—5.5 m. long. Branches glabrous, the spiciferous 2 mm. thick; collenchyma libriform, nearly continuous; a central and several peripheric lysigenous canals; abundant fuscous cells in bark and pith. *Leaves* very shortly petioled, glabrous; limb rigid-membranous when dry, copiously pellucid-dotted; 13—16 cm. long, 4.8—7 cm. wide; oblong-elliptic, acutely acuminate, the base inequilateral, rounded on the longest attenuate on the shortest side; penninerved, the central nerve emitting on each side and nearly from its whole length numerous patulo-subascendent nerves; petiole 4.8 mm. long of which 4 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, 17 mm. long. *Spike*: ♀ 5.6 cm. long, white when living, black when dry; rhachis hirsute; bract adnate, free and minutely ciliate at its margin, 4.5 mm. long, little less than 1 mm. wide, oblong, rounded at both ends; ovary free, glabrous; stigmas 3—4, ovate-acuminate. *Berry* globose, 4 mm. in diam., bright red when living, black when dry, scattered among the flowers.

PERAK: Larut, September, *King's Collector* 3327.

44. *PIPER COLLINUM*, C. DC. in Records Bot. Surv. Ind. VI. 17 (1912). Slender creeper 3.5—4.5 m. long. Branchlets glabrous, the

spiciferous 2 mm. thick; collenchyma continuous, not libriform; a single central lysigenous canal; yellow cells scattered in bark and pith. *Leaves* shortly petioled, glabrous; limb membranous when dry, black-dotted underneath; 13—16 cm. long, 4·8—7 cm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral and acute; penninerved, the central nerve emitting on each side 4 subascendent and thin nerves, the uppermost from 6 cm. above the base; petiole 6 mm. long, sheath prolonged nearly to the middle of the petiole. *Peduncle* 30 mm. long, glabrous. *Spike*: ♀ nearly 8 cm. long; rhachis hirsute; bract glabrous, its limb obovate, subsessile at its centre, 1·5 mm. longer; ovary free, ovate, glabrous; stigmas 3, linear. *Berry* stipitate, ovate acute at the apex, black when dry, 5 mm. long, its stipe shorter.

PERAK: Larut, Goping on limestone hills, at 300–500 ft., April, King's Collector 5906; *Scortechini*.

45. *PIPER MURICATUM*, Bl. in Verh. Batav. Nat. Genoots. XI. 219, f. 1 (1826) & Enum. Pl. Jav. fasc. I. 68; Miq. Syst. Pip. 326, Ill. Pip. 55, t. 55, in Hook. Lond. Journ. Bot. IV. 438 and Fl. Ind. Bat. I. ii. 2454; C. DC. in Prodr. XVI. i. 341; Hook. f. Fl. Br. Ind. V. 82.—DISTRIB: Java, Sumatra.

*forma peninsulare*, C. DC. n. f. in Records Bot. Surv. Ind. VI. 17 (1912). Herb or shrub up to 3·5 m. high. Branches densely hirsute, the spiciferous 3 mm. thick, hairs nearly 0·7 mm. long; collenchyma nearly wholly libriform in distinct laterally widened bundles or continuous; a central and several peripheric lysigenous canals. *Leaves* moderately long petioled; limb membranous when dry, up to 17 cm. long and 7 cm. wide, pilose on both surfaces, oblong-elliptic, shortly and subacutely acuminate, the base inequilateral and moderately cordate; penninerved, the central nerve emitting on each side 3–4 ascendent nerves, the uppermost from 5·5–7·5 cm. above the base; petiole densely hirsute, up to 10 mm. long of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* densely hirsute, as long as the petiole. *Spike*: ♀ about 4 cm. long; rhachis hirsute; bract glabrous, its limb obovate, 2 mm. long, 1 mm. wide, with a thick pedicel containing gelified cells; ovary free, ovate, globose, subacute at the apex; stigmas 3–5, linear. *Berry* stipitate, ovate-globose, subacute at the apex, glabrous, black when dry, up to 4 mm. long, its stipe 2 mm. long.

PERAK: *Scortechini*; Larut, Waterfall hill, at 500 ft. altitude,



with fruit sealing-wax red, *Ridley* 11025; at 100—2000 ft. altitude with fruit yellowish red, *King's Collector* 1958, 2880; at Jenan *Wray* 1757; SELANGOR: Pahang Track, *Ridley* 8531.

*forma pilistipes*, C. DC. l. c. 18 about 60 cm. high; limb sub-ovate-elliptic acutely acuminate, rounded and slightly inequilateral at the base. *Berry* red when living, its stipe hirtillous.

PERAK: Waterfall hill, in rocky localities, rich soil, *King's Collector* 4869; *Wray* 2076, 4237. SELANGOR: Kwala Lumpur, *Ridley* 4685.

*forma pilosior* Miq. in Linn. xxi, 485; limb elliptic or subovate-elliptic, moderately and acutely acuminate, equilateral and cordate at the base, densely fulvescent-hirsute on both surfaces.

SELANGOR: May, *Ridley* 7610.—DISTRIB. Java, Sumatra.

46. *PIPER PROTRACTUM*, C. DC. in Records Bot. Surv. Ind. VI. 18 (1912). Dioecious or monœcious and then with androgynous spikes. Branches densely hirsute, with hairs 1 mm. long, the spiciferous nearly 6 mm. thick; collenchyma continuous, partly libriform; a central and many peripheric lysigenous canals. *Leaves* shortly petioled; limb, 20·8—33·8 cm. long, 4·2—5·6 cm. wide, pilose on both surfaces especially along the nerves, oblong, subacutely acuminate, the base cordulate and slightly inequilateral; penninerved, the central nerve emitting on each side 4 nerves, the upper ones ascendent and opposite, the lower subascendent and much thinner than the others; petiole hirsute underneath, 10 mm. long of which 6 mm. between the sides of the limb, sheath prolonged above the base. *Peduncle* hirsute, about 12 mm. long. *Spike*: nearly 8·7 cm. long, with male flowers in its upper portion when androgynous, rhachis hirsute; bract glabrous, obovate, more or less attenuate towards its lower end, with a very short and thick pedicel; ovary free, ovate, glabrous; stigmas 3—4 linear. *Berry* globose, acute at the apex, 4 mm. long, its stipe nearly of same length.

JOHORE: Gunong Pulai, Castlewood, *Ridley*. SINGAPORE: Sungei Jurong, *Ridley* 5888; Chan-Chu-Kang, *Ridley* 6723.

47. *PIPER BIPEDALE*, C. DC. in Records Bot. Surv. Ind. VI. 19 (1912). Erect, 60 cm. high. Branches hirsute, the spiciferous 2 mm. thick; collenchym in distinct and laterally widened bundles, not libriform; a central and many peripheric lysigenous canals. *Leaves* moderately long-petioled; limb membranous when dry, hirsute on the nerves above and on the whole lamina underneath, 20 cm. long and up to 7 cm. wide, obovate-oblong, acutely acuminate; the base

slightly inequilateral, rounded on the longer, attenuate on the shorter side; penninerved, the central nerve emitting on each side 4—5 nerves of which the 2 uppermost ascendent, the others less so and much thinner; petiole densely hirsute, up to 14 mm. long of which 4 mm. between the sides of the limb. *Peduncle* hirsute, 12 mm. long. *Spikes*: ♀ about 32 mm. long, green when flowering; rhachis hirsute; bract glabrous, its limb obovate, 1.5 mm. long, with a central and thick pedicel containing gelified cells; ovary free, glabrous, ovate-acuminate; stigmas 3, linear and acute. *Berry* stipitate, ovate-globose, acute at the apex, black when dry, 4 mm. long, its stipe much shorter.

PERAK: at 300 ft. altitude, *Wray* 3710.

48. PIPER RIDLEYI, C. DC. in Records Bot. Surv. Ind. VI. 19 (1912). Erect, herb or shrub 2—3 ft. high. Branches densely hirsute with hairs nearly 1 mm. long, the spiciferous 4 mm. thick; collenchyma sparingly libriform in distinct bundles; a central and many peripheric lysigenous canals; sclerosed cells in the bark. *Leaves* shortly petioled; limb membranous when dry, nearly 25 cm. long and 12 cm. wide, hirsute on both surfaces; lanceolate-elliptic, acutely acuminate, the base acute and nearly equilateral; penninerved, the central nerve emitting on each side 5 ascendent nerves, the uppermost from about 6.5 cm. above the base; petiole hirsute, up to 10.5 mm. long. *Peduncle* hirsute, up to 1.4 cm. long in the male and up to 2.2 cm. in the female. *Spike*: ♂ nearly 10.5 cm. long and 2 mm. thick; rhachis hirsute; bract glabrous, obovate, subacute at the base with a short thick pedicel containing gelified cells; stamens 2, anthers rounded: ♀ a little shorter than in the male; rhachis hirsute; bract glabrous, obovate, up to 2 mm. long and 1.5 mm. wide with pedicel as in the male; ovary free, glabrous; stigmas 4, linear, acute. *Berry* globose, glabrous, shorter than its puberulous stipe.

PERAK: Maxwell's hill, *Curtis* 2047; Waterloo, *Curtis* 2697!; rich soil, rocky locality, at 1000-1500 ft. altitude, August, *King's Collector* 10784; Gunong Batu Putih, lower camp, alt. 3400 ft., *Wray* 428. SELANGOR: Ginting Peras, May, *Ridley* 7690; 15th mile along Pahang track, *Ridley* 8519;

*forma b*, branches with a continuous and nearly quite libriform collenchyma; spikes androgynous, the inferior flowers bisexual, the superior male.

PERAK: dense bamboo forest, at 500—700 ft. altitude, near Ulu

Kerling, flower light yellow, fruit sealing-wax red, *King's Collector* 8810.

49. *PIPER NIGRANTHERUM*, C. DC. in Records Bot. Surv. Ind. 20 (1912). Branches glabrous, the spiciferous 2 mm. thick; collenchyma not libriform, in distinct thick and laterally much widened bundles or even subcontinuous; no peripheric lysigenous canals; dark-reddish cells abundant in bark and pith. *Leaves* moderately long-petioled, glabrous; limb rigid-membranous when dry, minutely pellucid-dotted, up to 16.5 cm. long and 9 cm. wide; ovate, acutely acuminate, the base inequilateral, cordate, both sides inserted at the same level, one wider and longer than the other; 8-plinerved, the central nerve emitting on both sides 2 ascendent nerves the uppermost from 16 mm. above the base, and having on one side of it 3 on the other 2 nerves free from the base, the inner subascendent the outer more arcuate and much shorter; petiole nearly 15 mm. long, with sheath prolonged up to its middle. *Peduncle* as long as the petiole. *Spike*: ♂ about 9 cm. long and 3.5 mm. thick; rhachis hirsute; bract glabrous, its limb obovate, attenuate at the lower end, with a central clavate pedicel; stamens 2, anthers ovate, shorter than the filaments, dark black when dry.

SINGAPORE: in the Botanic Garden, and probably also spontaneous, *Ridley*.

50. *PIPER FILIPES*, C. DC. in Records Bot. Surv. Ind. 20 (1912). Creeping. Stalk and branches very slender, glabrous, the spiciferous branches up to 1 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal; a zone of sclerosed cells between the phloem masses of the peripheric fibro-vascular bundles. *Leaves* shortly petioled, glabrous; limb membranous when dry, minutely reddish-pellucid-dotted, about 9 cm. long, 4 cm. wide; oblong-ovate, acutely attenuate, the base rounded, both sides of same length but slightly unequally wide; 5-plinerved, the central nerve emitting 2 opposite or subopposite ascendent nerves from about 6 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole very thin, with a sheath prolonged a little above its base. *Peduncle* filiform, glabrous, nearly 28 mm. long. *Spike*: ♂ 16 mm. long and nearly 1 mm. thick when flowering, white when living; rhachis hirsute; bract glabrous, its limb rounded, 0.5 mm. in diam. with a short central pedicel; stamens 3, very short, anthers rounded, 4-valvate.

PERAK : at Larut at 3200—500 ft. in open jungle on rich rocky soil, *King's Collector* 3122.

51. *PIPER RUFIBRACTEUM*, C. DC. in Records Bot. Surv. Ind. VI. 21 (1912). Branches glabrous drying brown, the spiciferous 1 mm. thick; collenchyma subcontinuous and nearly libriform; no lysigenous canal. *Leaves* very shortly petioled, glabrous; limb subcoriaceous when dry, copiously pellucid-dotted; up to 9.5 cm. long and 3.5 cm. wide; oblong-elliptic, shortly and obtusely attenuate, the base inequilateral, rounded on both sides; 9-plinerved, the central nerve emitting 2 alternate ascendent nerves the uppermost from nearly 29 mm. above the base, and having on each side of it 3 nerves free from the base the most external more arcuate much thinner and shorter than the others; petiole 5.5 mm. long of which 3 mm. between the sides of the limb, sheath prolonged a little above the base. *Peduncle* glabrous 4.2 mm. long. *Spike*: ♂ 25.5 mm. long and 1 mm. thick when nearly flowering; rhachis glabrous; limb of bract obovate, subattenuate at its lower end, densely rufo-pubescent outside, with a glabrous short and thick pedicel containing gelified cells; stamens 2 or ? 3, anthers ovate, 4-valvate, shorter than the oblong filaments.

MALACCA : *Maingay* K. D. 1329.

52. *PIPER KUNSTLERI*, C. DC. in Records Bot. Surv. Ind. VI. 21 (1912). Erect, 60—90 cm. high. Branches glabrous, drying brown, the spiciferous 0.5 mm. thick; collenchyma continuous, sparingly libriform; a single central lysigenous canal. *Leaves* glabrous, very shortly petioled; limb membranous when dry, minutely pellucid-dotted, 12.5 cm. long, 4.5 cm. wide; elliptic-oblong, acutely and rather long acuminate, the base slightly inequilateral, attenuate on the shortest sides rounded on the longest; penninerved, the central nerve emitting on each side 3 ascendent thin nerves, the uppermost from 25—30 mm. above the base; petiole about 2 mm. long with basal sheath. *Peduncle* glabrous, very slender, 6 mm. long. *Spike*: ♂ nearly 21 mm. long and 2 mm. thick when flowering, rhachis hirsute; limb of the bract orbicular, glabrous, 0.6 mm. in diam., with a short hirsute and central pedicel; stamens 3, anthers ovate, 4-valvate, much shorter than the rather long filaments.

PENANG : in dense jungle on rocky ground, February, *King's Collector* 1315.

53. *PIPER CURTIPETIOLUM*, C. DC. in Records Bot. Surv. Ind. 22 (1912). Branches glabrous, reddish-brown when dry, the spiciferous nearly 1 mm. thick; collenchyma in distinct and laterally widened bundles, not libriform; no peripheric lysigenous canals. *Leaves* shortly petioled, glabrous; limb membranous when dry, minutely pellucid-dotted, 8.5 cm. long, 26 mm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral and acute; 5-plinerved, the central nerve emitting 2 ascendent alternate nerves, the uppermost from about 17 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole 5 mm. long, sheath basal. *Peduncle* glabrous, very slender, nearly 5 mm. long. *Spike*: ♂ about 17 mm. long and 1.5 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, nearly 1 mm. in diam., subsessile at its centre; stamens 3, unequally long, anthers ovate, much shorter than the oblong filaments when these are fully developed.

PERAK : *Scortechini*; Gunong Inas, Wray 4145.

54. *PIPER ERECTICAULE*, C. DC. in Records Bot. Surv. Ind. 22 (1912). Erect. Branches glabrous, the spiciferous about 1 mm. thick; collenchyma libriform, continuous, rather thick; a single central lysigenous canal. *Leaves* shortly petioled, glabrous; limb membranous, black-dotted underneath when dry, up to 15 cm. long and 4 cm. wide; elliptic-oblong, acutely acuminate, the base nearly equilateral and acute very slightly wider on one side; 8-plinerved, the central nerve emitting 5 ascendent nerves of which 2 on one side 3 on the other side, the uppermost from 3 cm. above the base, and having on each side of it one ascendent nerve much shorter than the others; petiole up to 5 mm. long, sheath basal. *Peduncle* glabrous, 7 mm. long. *Spike*: ♂ 13 mm. long when flowering; rhachis hirsute; bract glabrous, its limb rounded, 1 mm. in diam., shortly pedicellate near its centre; stamens 3, anthers ovate.

KEDAH : woods on Kedah Peak, an erect pepper, June, *Ridley*.

55. *PIPER EUCALYPTOLIMBUM*, C. DC. in Records Bot. Surv. Ind. 23 (1912). Scandent, 4.5–6 m. long. Branches glabrous, dark brown when dry, the spiciferous 9.5 mm. thick; collenchyma in distinct bundles and partly libriform; a single central lysigenous canal. *Leaves* shortly petioled, glabrous; limb membranous when dry, minutely reddish-pellucid-dotted, about 14.5 cm. long, 4 cm. wide; elliptic-lanceolate, acutely acuminate, the base acute distinctly nar-

rower on one side, equally long on both sides; 7-plinerved, the central nerve emitting on each side 2 ascendent thin nerves, the uppermost from 5.7 cm. above the base, and having on each side of it one ascendent nerve free from the base; petiole 6.3 mm. long, with basal sheath. *Peduncle* glabrous, 8.5 mm. long, very slender. *Spike*: ♂ 6.5 cm. long and 2 mm. thick when nearly flowering; rhachis hirsute; bract glabrous, its limb subovate-elliptic, 1.5 mm. long, with a very short and thick pedicel containing gelified cells; stamens 2, anthers elliptic, 2-valvate.

PERAK: at Larut, 2800—3000 ft. alt., *King's Collector* 3228.

56. *PIPER SUBRUBRISPICUM*, C. DC. in Records Bot. Surv. Ind. VI. 23 (1912). About 90 cm. high. Branches rather long-hirsute, the spiciferous 3 mm. thick; collenchyma continuous, not libriform; a single central lysigenous canal. *Leaves* long-petioled; limb membranous when dry, copiously pellucid-dotted, glabrous above, hirsute underneath, up to 15 cm. long and 14 cm. wide; rounded-ovate, obtusely acuminate, the base equilateral, deeply cordate; 9-plinerved, the central nerve emitting 2 opposite ascendent nerves from 4.2 mm. above the base and having on each side of it 3 nerves free from the base; petiole about 6 cm. long, hirsute on the back, the sheath prolonged up to nearly 14.5 mm. above the base, the stipules densely pubescent outside. *Peduncle* hirsute, 6.3 mm. long. *Spike*: ♂ about 6 cm. long and 4.2 mm. thick when flowering, obtuse at the top, white and tinted dull-pink when living, blackish red when dry; rhachis glabrous; bract glabrous, its limb oblong-obovate, attenuate towards the lower end, with a short central pedicel; stamens 3, anthers reniform, 4-valvate, shorter than the oblong filaments.

PERAK: upper land, *Wray* 3579.

57. *PIPER LONGAMENTUM*, C. DC. in Records Bot. Surv. Ind. VI. 23 (1912). Scandent? Branches hirsute, drying brown, the spiciferous nearly 1 mm. thick, hirtillous; collenchyma in distinct laterally widened bundles, its inner zone libriform; a single central lysigenous canal. *Leaves* shortly petioled; limb membranous when dry, minutely pellucid-dotted, up to 10.5 cm. long and 3.5 cm. wide, oblong-ovate-lanceolate, acutely and rather long acuminate, equilateral and acute at the base, sparingly pubescent above and rather densely underneath; 5-plinerved, the central nerve emitting 2 opposite ascendent nerves from about 14.7 mm. above the base and having on each side



of it one ascendent nerve free from the base; petiole 6.3 mm. long, densely hirtillous. *Peduncle* nearly glabrous, 8.4 mm. long, slender. *Spike*: ♂ nearly 14 cm. long, 1.5 mm. thick; rhachis hirsute; bract glabrous, its limb rounded, nearly 1 mm. in diam.; stamens 2, anthers ovate, 4-valvate, nearly as long as the oblong filaments.

PERAK: at Larut, 1800—3000 ft., August, *King's Collector* 32071.

58. *PIPER SUBSESSILILIMBUM*, C. DC. in Records Bot. Surv. Ind. VI. 24 (1902). Scandent, cirrhi ramulose. Branches glabrous, drying brown, the spiciferous nearly 1 mm. thick; collenchyma libriform, in distinct laterally much widened bundles; a central and many peripheral lysigenous canals; very abundant dark brown cells in bark and pith. *Leaves* subsessile, glabrous; limb membranous when dry, minutely pellucid-dotted, up to 19 cm. long and 5 cm. wide, subobovate-elliptic-oblong, acutely and moderately long acuminate, the base attenuate, shorter on one side; penninerved, the central nerve emitting on each side from nearly all its length about 20 thin subspreading nerves; petiole 3 mm. long of which 1 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, 8.4 mm. long. *Spike*: ♂ still juvenile, nearly 6 cm. long, up to 2 mm. thick, yellow when living; rhachis hirtillous; bract glabrous, its limb longitudinally elliptic with a short central pedicel.

PERAK: near Goping in dense jungle, August, *King's Collector* 578.

59. *PIPER OBOVANTHERUM*, C. DC. in Records Bot. Surv. Ind. VI. 24 (1912). Branches glabrous, dark brown when dry, the spiciferous 1 mm. thick, in branches 2 mm. thick; collenchyma libriform, in distinct bundles; a single central lysigenous canal. *Leaves* moderately long-petioled, glabrous; limb membranous when dry, elliptic, up to 14 cm. long and 9 cm. wide; elliptic, acutely acuminate, the base subrounded slightly longer on one side; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from nearly 12 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole 12 mm. long of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, nearly 19 mm. long, very slender. *Spike*: ♂ about 52 mm. long and nearly 1 mm. thick when flowering; rhachis hirtillous; bract adnate, obovate-oblong, subattenuate at the lower end, obtuse at the apex, minutely ciliate at the margins otherwise glabrous, 2.5 mm. long, up to 1 mm.

wide; stamens 3, anthers obovate, 4-valvate, a little longer than the oblong filaments.

PERAK: Government hill, March, *Ridley* 2732.

Perhaps the ♂ of *P. Zuccarinii*, C. DC. in Prodr. XVI. 1, 365.

60. *PIPER ARGYRITES*, Ridl. MSS. ex C. DC. in Records Bot. Surv. Ind. VI. 25 (1912). Branches glabrous, drying brown, the spiciferous up to 1.5 mm. thick; collenchyma continuous, sparsely libriform; a single central lysigenous canal. *Leaves* moderately petioled, glabrous; limb firm when dry, minutely pellucid-dotted, up to 18 cm. long and to 6 cm. wide; oblong-ovate, acutely acuminate, the base rounded and slightly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 15 mm. above the base and having on each side of it 2 nerves free from the base, the internal ascendent the external subascendent much thinner and shorter than the others; petiole 10 mm. long, 2 mm. of which between the sides of the limb, sheath prolonged up to the middle of the petiole. *Peduncle* glabrous, 25 mm. long. *Spike*: ♂ 8 cm. long and 3 mm. thick when nearly flowering; rhachis hirsute; bract glabrous, obovate, adnate to the rhachis, up to 1.5 mm. long; stamens 2, anthers reniform, 4-valvate, filaments of same width as the anthers.

SELANGOR: Gua Batu, December, *Ridley* 8176; Ginting Bidai, May, *Ridley* 7611.

61. *PIPER CLYPEATUM*, Wall. Cat. 6655 A and B (1828). Stem creeping, rooting from the nodes; collenchyma continuous, mainly libriform, a single row of intramedullary bundles; a single central lysigenous canal. *Leaves* very shortly petioled; limb rigid-membranous when dry, pellucid-dotted, glabrous above, pubescent underneath, round or ovate-rounded cordate at the base, 11.5–15 cm. diam. *Spikes* unknown. C. DC. in Prodr. XVI. i. 378; Hook. f. Fl. Br. Ind. V. 96 and 537. *P. obtusissimum* Miq. Syst. Pip. 337. *P. manillanum*, Miq. l. c. 339.

PENANG, SINGAPORE: *Wallich*.—DISTRIB. Assam, Manilla.

SECT. II.—*MULDERA*, Hook. f. Fl. Br. Ind. V. 79, *emend.*

(Sect. *SCHIZONEPHROS*, C. DC. in Prodr. XVI. 1. 24).

Spikes oppositifolious. Bracts adnate to the rhachis except at their lower and upper ends where they are connate into a receptacle containing stamens or ovaries. Flowers unisexual. Stamens 2–10

in a single or in a double transverse row. Ovary free, solitary or 2—4 free ovaries in a transverse row.

- 1°. Receptacle glabrous outside, pubescent inside:  
 Male and female receptacles sessile, much condensed, elliptic, bilabiate, the female receptacle containing a single ovary .. 62. *P. pentandrum*.  
 Male receptacle sessile, distant, elliptic, bilabiate .. .. 63. *P. flavimarginatum*.  
 Female receptacle subsessile, rounded, containing a single ovary .. .. 64. *P. firmum*.  
 2°. Receptacle pubescent outside and inside:  
 Male receptacle stipitate, rounded, 3—5- androus .. .. 65. *P. Maingayi*.  
 Male receptacle elliptic, bilabiate, 2- androus .. .. 66. *P. rarispicum*.  
 Male receptacle reniform, bilabiate, 8- androus .. .. 67. *P. Schizonephros*.  
 Female receptacle sessile, elliptic, bilabiate, containing 3—4 ovaries .. .. 68. *P. polygamum*.  
 3°. Species insufficiently known .. .. 69. *P. pachyphyllum*.

62. *PIPER PENTANDRUM*, C. DC. in Records Bot. Surv. Ind. VI. 25 (1912). Scandent. Branches glabrous, dark brown when dry, the spiciferous 2 mm. thick; collenchyma libriform in distinct laterally widened bundles; a single central lysigenous canal or none; a circle of sclerous cells tightly surrounding the peripheric fibro-vascular bundle. *Leaves* glabrous, moderately long-petioled; limb coriaceous, the upper ones 9—12.5 cm. long, 3.5—5 cm. wide, the lower up to 12.5 cm. long and 7.5 cm. wide; elliptic-lanceolate, acutely acuminate, the base equilateral, acute; 7-plinerved, the central nerve emitting 2 opposite or alternate nerves the uppermost from 10.5—12.5 mm. above the base, and having on each side of it 2 ascendent nerves free from the base; petiole about 10.5 mm. long, sheath basal. *Peduncles* glabrous, as long as the petiole. *Spike*: ♂ about 27 mm. long and 3 mm. thick, densely floriferous; rhachis glandular-asperulate when young, later glabrous; receptacles sessile, much condensed, elliptic, bilabiate, glabrous outside, hairy inside, woody; stamens 5, rarely 6, anthers ovate, 4-valvate, shorter than the oblong filaments: ♀ about 27 mm. long and 4 mm. thick; ovary free, glabrous, ovate; stigmas 3, elliptic-acute. *Berry* globose, 5 mm. in diam.

PERAK: upper land, at 300 ft., Wray 3655; *Scortechini* 114.

Var. *β. magnifolium* C. DC. l. c. Branches thicker; collenchyma libriform, continuous or nearly so; many peripherous lysigenous canals; no sclerose cells round the peripheric fibro-vascular bundles;

limb elliptic, 12 cm. long 7·5—10 c.m. wide; petiole, peduncle and female spike nearly 26 mm. long.

PERAK: *Scortechini* 779.

63. *PIPER FLAVIMARGINATUM*, C. DC. in Records Bot. Surv. Ind. 26 (1912). Branches glabrous, drying brown, the spiciferous 2 mm. thick; collenchyma libriform, continuous; a central and several peripheric lysigenous canals; in branches 4 mm. thick there is a continuous zone of sclerosed cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* moderately petioled, glabrous; limb elliptic, acutely acuminate, acute and inequilateral at the base, nearly 12 cm. long and 8 cm. wide; 7-plinerved, the central nerve emitting on each side 2 ascendent nerves, the uppermost from about 23 mm. above the base, and having on each side of it one ascendent nerve free from the base; petiole 14·8 mm. long with 6·3 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous nearly 26 mm. long. *Spike*: ♂ 6·3 cm. long; rhachis glabrous receptacles subsessile, loose, elliptic, bilabiate, glabrous outside hirsute inside; stamens 8, in a single row, anthers ovate, 4-valvate, shorter than the oblong filaments.

SINGAPORE: at Chan-Chu-Kang, *Ridley* 3772?; at Bukit Timah, *Ridley* 6425.

64. *PIPER FIRNUM*, C. DC. in Prodr. XVI. 1. 242. Scandent. Branches glabrous, reddish-fuscescent when dry, the spiciferous about 2 mm. thick; collenchyma libriform, in distinct bundles; a central and many peripheric lysigenous canals; sclerosed cells surrounding the masses of phloem of the peripheric fibro-vascular bundles. *Leaves* moderately petioled, glabrous; limb coriaceous, about 7·9 cm. long and 3 cm. wide, elliptic-lanceolate, acute at the top, the base acute, equilateral or slightly inequilateral; 5—6-plinerved, the central nerve emitting 2—3 ascendent nerves, the uppermost from near the base and having on each side of it one ascendent nerve free from the base; petiole 8·5 mm. long with basal sheath. *Peduncle* glabrous, 12·5 mm. long. *Spike*: ♀ nearly 4 cm. long; rhachis glabrous; receptacle sessile, rounded, flattened when adult, glabrous outside, hirsute with adpressed hairs inside. *Berry* globose, glabrous, 5 mm. in diam., brown when dry. *Muldera firma*, Miq. in Ann. Mus. Bot. Lugd.-Bat. V. 140.

PERAK: Tapa, *Wray* 1281.—DISTRIB: Java, Herb. Bogor, *Kurz* 1290; Sumatra, *Korthals*.

Differs from *Korthals*' specimen only by the presence of peripheric lysigenous canals.

65. *PIPER MAINGAYI*, Hook. f. Fl. Br. Ind. V. 80 (1885). Branches glabrous, fuscous when dry, the spiciferous 1.5 mm. thick; collenchyma libriform in distinct bundles; several peripheric lysigenous canals; a continuous zone of sclerosed cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* moderately long-petioled, glabrous; limb thickly coriaceous, 10.5—13 cm. long, 5.3—6.5 cm. wide, elliptic-lanceolate, the base equilateral; 5-plinerved, the central nerve emitting 2 ascendent nerves, the uppermost from 3.9—5.5 cm. above the base, and having on each side of it one ascendent nerve free from the base; petiole up to 8.5 mm. long, sheath basal. *Peduncle* a little longer than the petiole, finely tomentose as are the rhachis and receptacles. *Spike*: ♂ nearly 42 mm. long, densely velutino-puberulous; the receptacles stipitate, loose, rounded, 1.5 mm. in diam., densely velutino-puberulous outside and inside, 3—5. androus; anthers ovate, 4-valvate, shorter than the filaments: ♀ 5.3 cm. long; receptacles sessile, rounded, densely velutino-puberulous outside and inside. *Berry* globose, about 6 mm. in diam.

SINGAPORE AND MALACCA: *Maingay* K.D. 1334, 1336.

The leaves are like those of *P. firmum*, but the spikes, by their pubescence, are very different from those of that species.

66. *PIPER RARISPICUM*, C. DC. in Records Bot. Surv. Ind. VI. 27 (1912). Branches glabrous, blackish when dry, the spiciferous 1 mm. thick; collenchyma continuous, libriform; a central and many peripheric lysigenous canals. *Leaves* moderately long-petioled, glabrous; limb 10.5—13 cm. long, 5.8—7 cm. wide; ovate, acutely and rather shortly acuminate, the base rounded and slightly inequilateral; 7-plinerved, the central nerve emitting 2 ascendent nerves the uppermost from 14.5—16.5 mm. above the base, and having on each side of it 2 nerves free from the base, the inner ascendent the outer subascendent, much shorter and thinner than the others; petiole 14.5—19 mm. long. *Peduncle* slender, glabrous, 29 mm. long. *Spike*: ♂ rarely seen, 5.9 cm. long; rhachis puberulous; receptacles stipitate, elliptic, velutino-pubescent outside and inside, diandrous; anthers obovate, 4-valvate, about 0.5 mm. long, the oblong filament of same length.

PENANG: road to Sungei Penang, at 1500 ft., *Curtis* 1771.



67. *PIPER SCHIZONEPHROS*, C. DC. in Prodr. XVI. 1. 241 *exclud.* spec. Jungh. Branches glabrous, dark brown when dry, the spiciferous nearly 1 mm. thick; collenchyma libriform, in distinct bundles, a central and several peripheric lysigenous canals; a thick circle of sclerosed cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* glabrous; limb coriaceous, 8—13 cm. long, 2.6—5 cm. wide; elliptic-lanceolate, acute at both ends, the base equilateral; 5-plinerved, the central nerve emitting 2 ascendent alternate nerves the uppermost from about 26 mm. above the base and having on each side of it one ascendent nerve free from the base; petiole about 8.5 mm. long, sheath basal. *Peduncle* glabrous, nearly 18 mm. long, slender. *Spike*: ♂ 15.5—18.5 cm. long; rhachis very slender, hairy; receptacles stipitate, reniform; about 8-androus, filaments short, anthers small, rounded, 4-valvate, shorter than the filaments. Hook f. Fl. Br. Ind. V. 79. *Schizonephros glaucescens*, Griff. Notul. IV. 363.

PENANG: Government hill, *Curtis* 1771. MALACCA: at Ching, *Griffith* 4400.

68. *PIPER POLYGYNUM*, C. DC. in Records Bot. Surv. Ind. VI. 27 (1912). Large climber, stem up to 13 cm. thick. Branches glabrous, drying brown, the spiciferous 7 mm. thick; collenchyma in these 3 mm. thick libriform in distinct bundles, no lysigenous canal; a circle of sclerose cells tightly surrounding the peripheric fibro-vascular bundles. *Leaves* moderately long-petioled, glabrous; limb coriaceous when dry, elliptic, shortly and acutely acuminate, the base attenuate and slightly inequilateral; about 13 cm. long and 6.5 cm. wide; penninerved, the central nerve emitting on each side 3 alternate and ascendent nerves, the uppermost from 29 mm. above the base; petiole 14.5 mm. long of which 2 mm. between the sides of the limb, sheath basal. *Peduncle* glabrous, 29 mm. long, slender. *Spike*: ♀ nearly as long as the limb, rhachis minutely puberulous; receptacles rather distant, sessile, transversely elliptic, minutely velutinous outside, densely hirsute inside, containing 3—4 ovaries of which only one maturing; ovaries free, sessile, ovate, velutinous at the top; stigmas 3, linear. *Berry* glabrous, globose, nearly 5 mm. in diam.

PERAK, at 3500 ft., *Wray* 4068. SUNGEI UJONG: *Stephenson*.

69. *PIPER PACHYPHYLLUM*, Hook. f. Fl. Br. Ind. V. 80 (1888). Glabrous. *Leaves* moderately long-petioled; limb probably fleshy when living, thickly coriaceous and pale yellowish when dry; elliptic,



acute or acuminate, 10·5—15 cm. long, 5·5—10·5 cm. wide; 5—7-plinerved, the central nerve emitting 2 nerves and having on each side 1—2 nerves free from the base; petiole 6·3—12·6 mm. long. *Peduncle* much longer than the petiole, very stout; rhachis glabrous; bracts forming a ring round the base of the smooth globose berry (*ex* Hook. f. l.c.).

MALACCA: *Griffith*.

SECT. III.—HECKERIA, Hook f. Fl. Br. Ind. V. 195.

(Sect. POTOMORPHE C. DC. in Prodr. XVI. i. 133).

Spikes axillary or condensed at the top of an axillary branchlet. Bract hypopeltate. Flower bisexual. Stamens 2-3. Ovary free, stigmas 3.

70. PIPER UMBELLATUM, Linn. Sp. Pl. 43, var. *subpeltatum* C. DC. in Donn.-Sm. Enum. VI. 339. Shrub 0·9—2 m. high. Stem and branches glabrous, the spiciferous minutely glandulose, about 7 mm. thick; collenchyma not libriform, in distinct and laterally much widened bundles; 2 rows of intramedullary bundles, a single lysigenous canal. *Leaves* very long petioled; limb membranous when dry, copiously reddish-pellucid-dotted, velutino-puberulous on both surfaces; about 16—18 cm. long and up to 30 cm. wide, rounded-reniform, acutely and very shortly acuminate, the base equilateral, deeply cordate, 17-plinerved, the central nerve emitting 2 pairs of ascendent nerves, the uppermost from up to 26 mm. above the base, and having on each side of it 6 nerves diverging from the base; petiole velutino-puberulous on the back, 24—30 cm. long, sheath prolonged up to the middle of the petiole. Spiciferous branch 3—4 cm. long, minutely puberulous, bearing 5—7 peduncles about 12 cm. long in the axils of oblong-acuminate and early deciduous scales. *Spikes* up to 8 cm. long and 3 mm. thick; rhachis glabrous; limb of bract triangular, ciliate at the margin, with a central glabrous pedicel; stamens 2 on the extreme base of the ovary; anthers deciduous, very small, nearly reniform, 4-valvate. *Berry* obovate, trigonous, about 0·75 mm. long, glabrous; stigmas 3, linear, sessile, very short. *P. subpeltatum*, Willd. Sp. Pl. I. 166; C. DC. in Prodr. l.c. 333; Hook f. Fl. Br. Ind. V. 95. *Heckeria subpeltata*, Kth. in Linn. XIII. 571. *Potomorphe subpeltata*, Miq. Syst. Pip., 213, Illustr. 29, tab. 26, in Linn. XX. 129, Pl. Jungh. I. 116, Fl. Ind. Bat. I. ii. 437 and Suppl. 186; in Linn. XXI. 481; Wight Ic. t. 1925.

PENANG: Wallich 6638. PERAK: Kuala Weh, Wray 348; Larut, King 1890; Waterloo, Curtis 2698; *Scortechini*; Wray 2467. SELANGOR: Bidai, Ridley 7612.—DISTRIB. India (Deccan Peninsula from the Concan hills at 5000 ft. altitude southwards, Nilgiris), Ceylon, Malay Archipelago, Philippine Islands, Tropical America, West Indies, Tropical Africa.

SECT. IV.—ENCKEA, C. DC. in Prodr. XVI. i. 234, *emend.*

Spikes oppositifolious. Bract squamiform, more or less cuculate. Flower bisexual. Stamens 5—6, rarely 4. Ovary free, stigmas 3—5.

71. PIPER LAPPACEUM, C. DC. in Flor. Ind.-Chin. V. 68. Root fibrous, stem erect, 30—35 cm. high, glabrous; collenchyma continuous, not libriform; no lysigenous canal. *Leaves* moderately long petioled, glabrous; limb membranous when dry, pellucid-dotted; 10 cm. long, 6 cm. wide; ovate, acutely acuminate, the base inequilateral, cordate; 5—7-nerved, the 3 central nerves stouter than the others; petiole about 17 mm. long, of which 2 mm. between the sides of the limb, sheath more or less prolonged above the base, stipules attenuate and decurrent at the top. *Peduncle* glabrous, nearly 70 mm. long. *Spike* 60 mm. long; rhachis slender, minutely glandulose; flowers distant, pedicellate; bract ovate, 1 mm. long; pedicel of the flower 3 mm. long; stamens 6, filaments very short, anthers oblong; ovary rounded, covered with glochidiate processes; style terminal, carnose, glabrous; stigmas 4, ovate-linear. *Berry* globose, 3 mm. in diam, bristling with glochids, these about 3 mm. long. *P. Zippelia*, C. DC. in Prodr. XVI. i. 256. *Zippelia begoniæ-folia*, Bl. in Roem. Schult. Syst. VII, 1614, 1651; Miq. Syst. Pip. 258, Illustr., 58, tab. 92 f.c. *Zippelia lappacea*, Benn. Pl. Jav. Rar. 76, tab. 16.

PERAK: at Kwala Dipang, Ridley 9584; Ulu Batang Padang, Ridley 13786.—DISTRIB.: Tonkin, Java, Sumatra.

#### Family CIV. PROTEACEÆ.

Trees or shrubs, rarely herbs. *Leaves* usually coriaceous; alternate or scattered, rarely opposite or verticillate; entire, toothed or pinnatisect; stipules none. *Flowers* capitate, spicate, racemose or rarely solitary; hermaphrodite or by abortion polygamous or dioecious, regular or irregular; bracts small, caducous or nearly obsolete,

sometimes imbricate, persistent and hardened in fruit, forming a cone; bracteoles 0—2. *Perianth* inferior, segments 4, at first valvately connate in a tube with gibbous base at length more or less separating with free recurved tips. *Stamens* 4, inserted on or opposite to the perianth-segments; anthers erect, the connective continuous with the filaments; cells 2, introrse, dehiscence longitudinal. *Disk* consisting of 4 hypogynous scales, free or connate, alternating with the filaments, sometimes 0. *Ovary* superior, sessile or stipitate, 1-celled, often oblique; style terminal, the tip thickened; stigma terminal or lateral; ovules solitary or in pairs or many, biseriate. *Fruit* a nut or drupe, indehiscent or ultimately opening on the inner edge or at the tip, or a follicle or capsule with often thickly coriaceous valves. *Seeds* solitary or in pairs or few; testa membranous or coriaceous, sometimes winged; albumen 0; cotyledons compressed or fleshy, often unequal; radicle short, inferior or lateral. **DISTRIB.** Genera about 50, species very many, chiefly Australian or South African, a few only in tropical Asia, Africa and America, none in Europe, N. Asia or N. America.

#### 1. *HELICIA*, Lour.

Trees or large shrubs. *Leaves* alternate, entire, toothed or rarely pinnatisect. *Flowers* in terminal and axillary racemes, hermaphrodite, regular, pedicelled, usually in pairs; bracts small, caducous; bracteoles minute. *Perianth*—tube slender, limb narrow, ovate or oblong, straight, segments revolute when in flower. *Stamens* 4, anthers oblong, connective produced in an apiculus. *Hypogynous scales* free or connate in a cup-shaped disk. *Ovary* sessile; style slender; stigma terminal; ovules 2, basal or lateral, attached below the middle. *Fruit* a subglobose hard nut. *Seeds* 1—2, subglobose or hemispheric; testa rugose or veined; cotyledons fleshy. **DISTRIB.** Tropical Asia and Australia.

Racemes glabrous; hypogynous scales connate or completely forming a cup; bracts and bracteoles minute.

Leaves petioled.

Petiole up to 1 cm. long; leaves subcoriaceous,  
entire or distantly serrated in the upper half;  
perianth moderately slender, thick

.. 1. *H. attenuata*.

Petiole 2—3 cm. long; leaves firmly coriaceous,  
entire; perianth stout, very thick

.. 2. *H. petiolaris*.

Leaves sessile or nearly so, the margins of the blade  
decurrent quite to the base.

- Leaves entire; hypogynous scales in a cup;  
 perianth thick .. .. 3. *H. Kingiana*.  
 Leaves coarsely serrate in the upper half; perianth  
 thin .. .. 4. *H. robusta*.  
 Racemes pubescent, tomentose or villous; hypogynous  
 scales free.  
 Racemes densely rufous-pubescent or velvety; leaves  
 entire or nearly so.  
 Leaves rufous-pubescent beneath, petioles 3—4  
 cm. long; racemes 15—20 cm. long; bract and  
 bracteoles ovate, minute .. .. 5. *H. rufescens*.  
 Leaves plumbeous beneath, nearly glabrous,  
 petioles 1—1.5 cm. long; racemes dense, short;  
 bract and bracteoles linear, conspicuous .. 6. *H. velutina*.  
 Leaves glabrous, yellowish when dry, petiole 1—2  
 cm. long; racemes slender, 5—10 cm. long;  
 bract and bracteoles acuminate, short .. 7. *H. excelsa*.  
 Leaves glabrous, nearly black when dry, petiole  
 about 1 cm. long; racemes slender, short; bract  
 and bracteoles rather short .. .. 8. *H. Scortechinii*.  
 Racemes glabrescent; bracts and bracteoles short.  
 Racemes 10—15 cm. long; leaves yellowish when  
 dry, entire; leaf petiole over 1 cm. long .. 7. *H. excelsa*.  
 vars. *salicifolia*  
 and *Forbesii*.  
 Racemes 15—20 cm. long; leaves prominently  
 serrate, olive-brown when dry, under-surface  
 yellowish; leaf petiole under 1 cm. long .. 9. *H. Curtisii*.

1. *HELICIA ATTENUATA*, Bl. in Ann. Sc. Nat. Ser. 2. 1. 216 (1834). A large shrub or low tree reaching a height of 6—9 m. with a diam. of up to 30—40 cm.; branches spreading; branchlets pale brown, moderate-sized, smooth; all parts quite glabrous. Leaves subcoriaceous; obovate or oblanceolate, acute or acuminate at apex, long attenuate at base; olive-green or reddish when dry, the upper surface slightly shining and somewhat bullate; margins entire or with a few distant serratures in the upper half; 12—30 cm. long, 5—11 cm. broad; midrib slender, raised on both surfaces; main nerves 8—10 pairs, irregular, curving upwards and the upper ones interarching; secondary nerves and transverse nervules irregularly but prominently netted as is the reticulation; petiole thickened at base, up to 1 cm. long, bordered above by the decurrent margins of the blade. Flowers pale yellow, in pairs or single, rather distant, from the rhachis of a cylindrical

raceme reaching 20—30 cm. in length, from the axils of fallen leaves of the previous year's wood; pedicels at right angles to the rhachis, 3—5 mm. long; bract and bracteoles very small, acute, caducous; perianth rather thick, in bud linear-clavate, 2—3 cm. long; hypogynous scales connate, truncate, dentate, 1 mm. long. *Stamens* 4; anthers oblong, 2-celled; filaments very short, connective produced in a blunt apiculus. *Ovary* glabrous, style as long as the perianth, stigma ellipsoid-clavate. *Fruit* ovoid, 3—4 cm. long, 2—3.5 cm. in diam., narrowed at both ends, obscurely 6-angled, the thickened pedicel 3 mm. in diam. *Seeds* 1—2, subglobose, testa thinly leathery; cotyledons hemispheric. Benn. in Horsf. Pl. Jav. Rar. 83; Meissn. in DC. Prodr. XIV. 439; Miq. Fl. Ind. Bat. I. i. 985; Hook. f. Fl. Br. Ind. V. 190; Koord. & Val. Bijdr. V. 313. *Rhopala attenuata*, Jack in McLell. Calc. Journ. IV. 352; and in Mal. Misc. I. 2. 10; Hook. Bot. Misc. II. 65; Wall. Cat. 1040; Walp. Ann. I. 592, V. 313. *R. moluccana*, Roxb. Hort. Beng. 83; Fl. Ind. Ed. Carey and Wall. I. 364 and Fl. Ind. I. 361 *non* Br. *nec* Jack. *R. racemosa*, Roxb. M.S. in Herbb. Linn. Soc. Lond. and Kew.

PENANG: Jack (Wallich 1040!); at Tulloh Bahang, Curtis 1181!; at Waterfall, Curtis 2765!; Ridley 12683!. PERAK: Scortechini 195!, 196!, 795!; at Batu Togo, Tupai, Waterfall Hill, etc. Wray 2159!, 2671!, 3144!, 3156!, 4052!; in various places from sea level to 600 m. alt., King's Collector 764!, 3383!, 4301!, 4594!, 5931!, 8496!, 8795!. SELANGOR: at Kwala Lumpur, Curtis 2372!; at Dusum Tua, Ridley!. PAHANG: at Tahan river, Ridley!. JOHORE: at Mount Austin, Ridley 13008!.—DISTRIB. Java (Koorders).

2. *HELICIA PETIOLARIS*, Benn. in Horsf. Pl. Jav. Rar. 84 (1838). A tree reaching 18—20 m. in height and 45—60 cm. in diam. of stem; branches spreading; branchlets stout, smooth, grey, uppermost nearly black and angled; all parts glabrous. *Leaves* firmly coriaceous; broadly obovate, obtuse or obtusely acute at apex, long-cuneate at base, rarely slightly lobed; upper surface shining, olive-green, lower also somewhat shining and purplish when dry; margins entire; 10—35 cm. long, 5—15 cm. broad; midrib stout, raised on both surfaces; main nerves 7—9 pairs, somewhat impressed above, spreading, curving upwards to join in diminishing loops near the margin; secondary nerves and transverse nervules irregularly netted, all nerves and reticulation slightly raised on both surfaces; petiole 2—3 cm. long, channelled above by the decurrent margins of the blade, the base enlarged. *Flowers* cream-

coloured, geminate, on bifid pedicels from the stout angular rhachis of an elongated axillary or lateral raceme reaching 20—30 cm. in length; pedicels at right angles to the rhachis, 4—6 mm. long, the two branches slightly shorter; bract and bracteoles minute, acute, caducous; perianth very thick, coriaceous, in bud linear-clavate, 2—2.5 cm. long, the limb of the lobes elliptic, the lobes spirally recurved in flower; hypogynous scales connate, truncated, toothed, 1 mm. long. *Stamens* 4; anthers oblong, 2-celled, 3 mm. long; filaments very short; connective produced in an ovate apiculus. *Ovary* glabrous; style nearly as long as the perianth lobes; stigma clavate, sulcate. *Fruit* depressed-ovoid, shortly pointed, 2 cm. long, 2.5 cm. in diam., smooth; pedicel little thickened, 2 mm. in diam. *Seed* subglobose, testa membranous, cotyledons hemispheric. Meissn. in DC. Prodr. XIV. 438; Miq. Fl. Ind. Bat. I. i. 983; Hook. f. Fl. Br. Ind. v. 190. *Rhopala moluccana*, Jack in McClell. Calc. Journ. 208, Mal. Misc. I. ii. 10; Hook. Bot. Misc. II. 65; Wall. Cat. 1041 non Br. nec Roxb.

PENANG: Cultivated, Jack (Wallich 1041!). PERAK: at Goping, Scortechini 1977!; in various places in forest up to 250 m. alt., King's Collector 4641!, 5438!, 8442!, 8687!. SELANGOR: 15th mile Pahang track, Ridley 8499!; at Kwala Lumpur, Goodenough 10472!. SINGAPORE: Ridley 3625!, 4695!, 4696!, 6257!, etc; at Changi Reserve, Goodenough 141!

3. *HELICIA KINGIANA*, Prain in Kew Bull. 342 (1912). A tree, reaching a height of 15—20 m. and 30—45 cm. in diam. of stem, all parts quite glabrous; branches spreading; branchlets stout, smooth, dark grey to nearly black, uppermost sharply angled. *Leaves* coriaceous; obovate or elliptic-obovate, rounded or shortly obtusely sometimes emarginately acuminate at apex, cuneately attenuate at base; upper surface light green, dark olive-green when dry, lower purplish brown when dry, both surfaces dull; margins entire, recurved; 15—25 cm. long, 6—11 cm. broad; midrib stout, raised on both surfaces; main nerves 10—12 pairs, the lowest 1—2 pairs very oblique from close to the base, the rest more widely curving and joining in gradually diminishing loops; transverse nervules prominent, irregular, angularly branching and enclosing an angular areolate reticulation; petiole none or very short, the margins of the blade extending to the enlarged base. *Racemes* stout, stiff, singly from the axils of the leaves or of fallen leaves, up to 30 cm. long; pedicels stout, 4—5 mm. long, bearing two flowers on branches 4.5—6 mm. long; bract and



bracteoles minute, acute, caducous; perianth in bud 3·5—4 cm. long, thick, the apex angular; hypogynous scales connate in a truncate slightly dentate cup 1—1·5 mm. long. *Stamens* with elliptic anthers, the connective broad, its apiculus blunt, cells 3—3·5 mm. long; filaments broad, 2 mm. long. *Ovary* ovoid, glabrous; style and clavate stigma as long as perianth. *Fruit* globose or ovoid, somewhat pointed at both ends, ridged on one side, 3—4 cm. long, 2—3 cm. broad; pericarp smooth, 2 mm. thick. *Seed* conform to the drupe; testa membranous; cotyledons 2—4, granular.

PERAK: in open forest, from the low ground to the tops of hills 250—300 m. alt. near Larut, *King's Collector* 3714!, 3881!, 6217!; at lower camp, Gunong Batu Putih, 1200 m. alt., *Wray* 983!, 1160!.

4. *HELICIA ROBUSTA*, Wall. Cat. 2702 (1820). A small tree reaching 8 m. in height and 15 cm. in diam. of stem; branchlets smooth with greyish-brown bark; all parts quite glabrous except sometimes the rhachis of the racemes which is slightly puberulous. *Leaves* subcoriaceous; obovate or oblanceolate, obtuse or obtusely acute or even acuminate at apex, cuneately narrowed in the lower half, finally rounded or subcordate; upper surface dull or shining, greenish when dry, lower dull dark brown; margin coarsely serrate, the lower part often entire; 15—25 cm. long, 6—12 cm. broad; midrib stout, raised on both surfaces; main nerves 10—12 pairs, irregular, usually obliquely curved to the margin; transverse nervules irregularly netted, prominent; petiole none or very short and much thickened. *Racemes* axillary, up to 30 cm. long, the rhachis moderately stout, angled; pedicels short, dividing near the base into two usually of different lengths, in all nearly 5 mm. long; bract and bracteoles minute, acute; perianth thin, in bud linear clavate, 2—3 cm. long, the limb of the lobes elliptic, recurved, the lobes spirally recurved in flower; hypogynous scales more or less connate, truncate, denticulate, 1—1·5 mm. long. *Stamens* 4; anthers oblong, 3 mm. long; filaments very short; connective produced in a rounded apiculus. *Ovary* glabrous, style nearly as long as the perianth lobes; stigma clavate, sulcate. *Fruit* obliquely globose, apiculate, obscurely 4—6—ribbed, reaching 2·5—3 cm. in diam., smooth; fruiting pedicel very short, 4 mm. in diam. *Seed* globose, testa very thin, cotyledons hemispheric. Bl. in Ann. Sc. Nat. Ser. 2. i. 220; Benn. in Horsf. Pl. Jav. Rar. 83; Meissn. in DC. Prodr. XIV. 440; Miq. Fl. Ind. Bat. I. i. 986; Kurz For. Fl. II. 311; Hook.

f. Fl. Br. Ind. v. 191; Brandis Ind. Trees 543. *H. macrophylla*, Wall. Cat. 3661. *H. javanica*, Bl. in Ann. Sc. Nat. Ser. 2. i. 217; Benn. l.c. 83, t. 18; Meissn. l.c. 440; Miq. l.c. 986; Koord. & Val. Bijdr. V. 306. *H. castanecifolia*, Meissn l.c. 441. *Helittophyllum javanicum*, Blume Bijdr. 652. *Rhopala robusta*, Roxb. Fl. Ind. ed. Carey & Wall. I. 366 and Fl. Ind. I. 363; Wight l.c. t. 191. *R. glabrata*, Wall. Cat. 1039.

MALACCA: Griffith K. D. 4367!; Cuming 2338!; Maingay K. D. 1309!, 1311!; at Sungei Udang, Derry 523!. SELANGOR: at Kwala Lumpur, Ridley 10225!.—JOHORE: at Bukit Tana Abang, Lake & Kelsall 4010!. DISTRIB: India (Assam and Khasia), Burma, Java, (Forbes 377!, 670!, 2731! etc.), Sumatra (Forbes 2212!).

5. *HELICIA RUFESCENS*, Prain in Kew Bull. 342 (1912). A large tree reaching a height of 18—24 m. and 60 cm. or more in diam. of stem; branches spreading; branchlets stout, dark ashy grey, the uppermost densely dark rufous-tomentose. Leaves subcoriaceous; obovate or broadly oblanceolate, acute or very shortly acuminate at apex, long-cuneate at base; upper surface dark green, dull olive-green when dry, glabrous except on the midrib and nerves when young, lower reddish brown, densely rufous—pubescent when young, gradually glabrescent when older; margin entire; 15—30 cm. long, 6—11 cm. broad; midrib prominent, raised on both surfaces, crispedly brown-puberulous above; main nerves 16—20 pairs, close and parallel and straight in the lower, more distant and curved in the upper half and there joining in angular loops; transverse nervules irregular, angled and branched; reticulation irregular, prominent; petiole 3—4 cm. long, thickened at base, densely rufous-tomentose. Racemes single or in pairs from the axils of the leaves or of fallen leaves, densely dark rufous—pubescent, 15—20 cm. long; pedicel short, 1 mm. long, bearing two flowers on branches 2 mm. long; bract and bracteoles ovate, minute; perianth in bud 10—12 mm. long, the lobes in flower very much spirally curved, glabrous within; hypogynous scales free, obtuse, glabrous. Stamens with linear anthers 2.5—3 mm. long, the connective apiculus blunt; filaments slender, 1 mm. long. Ovary densely rufous-villous; style slender, including the cylindric grooved stigma as long as perianth. Fruit yellowish—brown, subglobose, flattened on both sides, slightly ridged on the outer, apex and base acute, 3 cm. long, 2.5 cm. broad, 1.5 cm. thick, rufous-tomentose, gradually becoming glabrescent; pericarp 2—3

mm. thick. *Seed* conform to the fruit, testa membranous; cotyledons fleshy, channelled across the middle.

PERAK: in open forests about Larut and Thaiping, on hills from 150—450 m. alt., *King's Collector* 4213!, 4939!, 5096!, 8504!; at Waterfall Hill and Tapai, *Wray* 2083!, 3084!.

6. *HELICIA VELUTINA*, Prain in Kew Bull. 343 (1912). A tree reaching a height of 15—20 cm. and 25—33 cm. in diam. of stem; branchlets stout, grey, striate, the uppermost minutely grey-puberulous. *Leaves* chartaceous; broadly oblanceolate, rather abruptly acuminate at apex, cuneate at base; upper surface bright green, olive green and shining when dry, glabrous, lower also somewhat shining, plumbeous, glabrous except a slight pubescence along the midrib; margin entire, recurved when dry; 10—20 cm. long, 4—7 cm. broad; midrib moderately stout, prominent on both surfaces; main nerves 14—16 pairs, impressed above, raised beneath, straight and parallel, interarching near the margin; secondary nerves and transverse nervules irregular, branched, enclosing an angular reticulation; petiole 1—1.5 cm. long, thickened at base, the upper part bordered by the decurrent margins of the blade. *Racemes* single or in pairs from the axils of fallen leaves on the past year's wood chiefly, up to 7 cm. long (bud—specimens only), densely rufous velvety; flowers densely congested, in pairs on very short pedicels or sessile, ascending; bract linear, 7—8 mm. long, bracteoles linear, 4—5 mm. long; perianth in bud shortly and thickly clavate, 5 mm. long, glabrous within; hypogynous scales minute, free, truncate, glabrous. *Stamens* with oblong nearly sessile anthers, the connective-apiculus short, thick. *Ovary* ovoid, glabrous; style thick, stigma clavate. *Fruit* not known.

PERAK: in open forest at Gunong Bubu, Larut, 600—750 m. alt., *King's Collector* 7316!

7. *HELICIA EXCELSA*, Bl. in Ann. Sc. Nat. Ser. 2. i. 219 (1834). A large tree reaching 18—24 m. in height and 40—50 cm. in diam. of stem; bark grey, scabrous; branches spreading; branchlets rather slender, grey, the uppermost and innovations densely dark rusty-tomentose. *Leaves* coriaceous; obovate or oblanceolate, obtusely rather abruptly acuminate at apex, long cuneate at base; margins entire or rarely the upper part coarsely serrate; both surfaces glabrous, yellowish-green when dry, the upper shining; 10—15 cm.

long, 3—6 cm. broad; midrib slender, raised beneath; main nerves 6—8 pairs, irregular, raised on the upper surface, soon branching and irregularly anastomosing; reticulation irregular, prominent; petiole slender, 1—2 cm. long, the upper part bordered by the decurrent margins of the blade. *Flowers* yellowish-green, in pairs in axillary or terminal racemes 5—10 cm. long, densely dark rusty-villous; pedicels 1—2 mm. long, 2-flowered, branches 1—1.5 mm. long; bract acuminate, 1—2 mm. long, at the bases of the pedicels, bracteoles on the branches 1 mm.; perianth slender, 4—6 mm. long, clavate in bud; hypogynous scales 4, free, ovoid, glabrous, .5 mm. long. *Stamens* 4; anthers 1—2 mm. long, the connective rugose, produced in a short apiculus. *Ovary* ovoid, ferruginous-villous; style slender, as long as perianth; stigma clavate. *Fruit* ovoid, oblique, smooth, 10 mm. long, 7—8 mm. in diam.; pedicel slightly thickened, 3 mm. in diam. Benn. in Horsf. Pl. Jav. Rar. 84; Meissn. in DC. Prodr. XIV. 441; Kurz For. Fl. II. 312; Miq. Fl. Ind. Bat. I. i. 987; Hook. f. Fl. Br. Ind. V. 191. *Rhopala excelsa*, Roxb. Fl. Ind. I. 363 and ed. Carey & Wall. I. 365; Spr. Syst. Veg. I. 482. 11; Roem. & Sch. Syst. Veg. Mant. III. 285; Wight Ic. t. 190 (copied from Roxb.).

PERAK: on tops of low hills in open jungle near Goping and Ulu Bubong, 90—250 m. alt., *King's Collector* 5928!, 6100!, 10836!; near Gunong Bubu, *Scortechini* 774!. MALACCA: at Sungei Hudang, etc. *Goodenough* 1388! 1760!; *Derry* 456!, 530!. SINGAPORE: at Chenchukang, *Goodenough* 2759!; at Kranji, *Ridley* 6428!.—DISTRIB. India (Chittagong), Burma (Tenasserim).

Var. *salicifolia*. Innovations nearly glabrous. *Leaves* narrower, less abruptly and obtusely acuminate at apex, entire. *Racemes* longer, 10—13 cm. long, the rhachis and perianth nearly glabrous, the bract and bracteoles longer; the hypogynous scales 1 mm. long, oblong. *Fruit* larger, nearly 2 cm. long, 10—12 mm. broad, blue-black when ripe. *H. salicifolia*, Presl. Epimel. Bot. 247 (1849); Meissn. in DC. Prodr. XIV. 439; Kurz For. Fl. II. 312. *H. excelsa* var. *edentula* Benn. in Horsf. Pl. Jav. Rar. 84.

PERAK: in dense jungle on low ground, Goping, *King's Collector* 691!, 6096!; at Simpang, *Wray* 2310!; at Gunong Haram Parah, *Scortechini* 687!. MALACCA: *Maingay* K. D. 1310!; at Sungei Hudang, *Derry* 1202!.—DISTRIB. Burma (Tenasserim, *Helper* 4366!)

var. *Forbesii*. Similar to the last, but the *leaves* much larger, 12—22 cm. long, 4—8 cm. broad; main nerves up to 10 pairs.

*Racemes* still more glabrous, longer, up to 15 cm.; perianth longer and more slender; bract broader.

PERAK : in open jungle on low ground near Larut, *King's Collector* 3392!.—DISTRIB. Sumatra (at Moeara Merg Kulem, 450 m. alt. *Forbes*, 3047 a!.)

8. *HELICIA SCORTECHINII*, Gamble in Kew Bull. 117 (1913). A tree?, branchlets smooth, pale brown, the youngest slightly puberulous. *Leaves* chartaceous; oblanceolate, abruptly caudate—acuminate at apex, cuneate at base; both surfaces dull, the upper nearly black when dry, glabrous, the lower reddish-brown with a few hairs scattered on the surface; margin shortly but closely serrate on the upper two-thirds, entire towards the base; 12–18 cm. long, 4–6 cm. broad; midrib slender, prominent beneath; main nerves 8–10 pairs curving towards the margin and there joined in angular loops, prominent beneath; transverse nervules irregular, branching, enclosing an irregular reticulation; petiole about 1 cm. long, the margins of the blade decurrent almost to its base. *Racemes* (young only) from the axils of fallen leaves, solitary or geminate, minutely ferruginous-hirsute; pedicels short, 2-flowered; bract ovate, acuminate, 2 mm. long; bracteoles similar, 1 mm. long; perianth in bud clavate; hypogynous scales free, ovate, glabrous. *Ovary* glabrous, style short, stigma cylindric clavate. *Fruit* not known.

PERAK : *Scortechini* 467!.

The specimens are in bud only and the description is taken almost entirely from that of Father Scortechini.

9. *HELICIA CURTISII*, Gamble in Kew Bull. 116 (1913). A tree reaching 6–9 m. in height; branchlets pale brown, smooth, glabrous. *Leaves* chartaceous; oblanceolate, acuminate, often obtusely, at apex, long-attenuate at base; both surfaces glabrous, olive-brown when dry, the lower rather paler and reddish; margins strongly serrate from the middle upwards; 12–18 cm. long, 4–6 cm. broad; midrib slender, prominent beneath; main nerves 8–10 pairs, prominent especially beneath, curving to near the margin and there more or less interarching; transverse nervules few, branching and enclosing the areolate reticulation; petiole under 1 cm. long, the margins of the blade decurrent nearly to its base. *Racemes* axillary, slender, 15–20 cm. long, the rhachis and pedicels minutely rusty-

puberulous when young, later glabrescent; pedicels slender, 2 mm. long, then bifid, the branches as long again; bract and bracteoles minute, caducous; perianth in bud clavate, slender, thin, 7—8 mm. long, the lobes oblong acute; hypogynous scales free, ovate, obtuse, 1 mm. long. *Stamens* 4; anthers oblong, connective apiculate; filaments short, flattened. *Ovary* ovoid, ferruginous-villous; style 5—6 mm. long, very slender; stigma narrowly cylindric. *Fruit* not known.

PENANG: at Penara Bukit, 450 m. alt., *Curtis* 3020 !.

### Family CVII. LORANTHACEÆ.

Evergreen shrubs, rarely herbs, usually parasitic on the branches of trees; stems much-branched, often jointed. *Leaves* usually opposite sometimes alternate, coriaceous, entire, sometimes reduced to scales or absent; stipules none. *Flowers* regular or zygomorphic, hermaphrodite or unisexual, sometimes large and brightly coloured, sometimes inconspicuous; racemose, spicate, capitate or fascicled, usually bracteate and often with 2 or more bracteoles. *Calyx* adnate to the ovary; limb annular or cupular, truncate, entire or shortly toothed, sometimes none. *Petals* or perianth segments 3—8, valvate, free or more or less connate in a tube. *Stamens* as many as, and opposite to, the petals and more or less adnate to them; filaments slender or none; anthers basifixed or dorsifixed, opening by longitudinal slits or by rows of cells or by pores. *Ovary* inferior, 1-celled; usually without distinct placenta or ovule; style short or long; stigma simple or hardly lobed. *Fruit* a 1-seeded berry or drupe with fleshy pericarp and often viscid mesocarp. *Seed* solitary without distinct testa; albumen fleshy or absent; embryos 1, rarely 2, with distinct hypocotyl and 2 or more cotyledons; radicle superior. **DISTRIB.** Chiefly tropical, a few in temperate regions. Many species.

*Calyx* present though the limb is sometimes reduced to merely a rim; flowers hermaphrodite (Subf. I. LORANTHEÆ).

*Calyx*-tube supported by a bract, no bracteoles

Anthers basifixed	..	..	..	1. LORANTHUS.
Anthers dorsifixed	..	..	..	2. LOXANTHERA.

*Calyx*-tube supported by a bract and two bracteoles;

anthers basifixed	..	..	..	3. ELYTRANTHE.
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- Calyx-tube without bract, bracteoles 0—4; inflorescence capitate, involucrate; anthers basifixed .. .. 4. LEPEOSTEGERES.
- Calyx obsolete or represented by a rim; flowers unisexual (Subf. II. VISCEÆ).
- Anthers 2-celled, opening longitudinally.
- Plants with leaves; flowers monœcious in jointed spikes, at the bases of the joints .. .. 5. GINALLOA.
- Plants without leaves; flowers dicecious or monœcious surrounding the bases of the internodes .. 6. KORTHALSELLA.
- Anthers opening by many pores; flowers in axillary triads or flattened capitula.
- Plants with leaves or leafless; anthers combined with the perianth-lobes .. .. 7. VISCUM.
- Plants with leaves; anthers not combined with the perianth-lobes .. .. 8. NOTOTHIXOS.

I have been unable to examine specimens of *Nallogia Gaudichaudiana*, H. Baill. in Bull. Soc. Linn. Par. II. 985 (1892) said to be a Malacca tree (?) with cylindric branches, alternate membranous leaves and axillary flowers of which only the ♂ are known. The perianth is 5-lobed and the anthers open by lateral clefts. For the generic description see Baill. Hist. des Pl. XI. 478.

### 1. LORANTHUS, Linn. (restricted).

Parasitic shrubs, with many branches. *Leaves* opposite, sub-opposite or alternate, usually thick and fleshy or coriaceous, entire. *Flowers* hermaphrodite, usually coloured, in racemes spikes or fascicles, in the axils of the leaves or of fallen leaves, rarely terminal; bract usually small, supporting the base of the calyx-tube, no bracteoles. *Calyx*-tube adnate to the ovary; the limb short, truncate or toothed, sometimes almost obsolete. *Corolla* polypetalous or gamopetalous, regular or zygomorphic; lobes 4—6, valvate, free or more or less connate in a tube, erect or reflexed, the tube often split down one side. *Stamens* as many as the corolla-lobes and adnate to them; filaments slender or thickened; anthers basifixed, usually linear, opening by longitudinal cells, sometimes transversely septate. *Disk* none. *Ovary* 1-celled; style filiform, sometimes geniculate; stigma entire, obtuse or capitate. *Fruit* baccate, usually globose ovoid or ellipsoid, crowned by the persistent calyx. *Seed* albuminous, adnate to the pericarp, often surrounded by glutinous pulp; testa none; embryo straight, terete. **DISTRIB.** Most tropical countries of the Old World.

Corolla lobes free (Subgenus I. EULORANTHUS)

Flowers in racemes or spikes.

Petals 5 (Sect. I. LORANTHOBOTRYS).

Racemes involucrate at base (Subsect. 1. CHIRIDIUM).

Leaves sometimes whorled, lanceolate to ovate-oblong, 8—20 cm. long .. ..

1. *L. pulcher.*

Raceme-bases sunk in the substance of the branchlet; style filiform (Subsect. 2. COLEOBOTRYS).

Leaves elliptic or lanceolate, acute, 7—13 cm. long; petals rather thin; anthers 13—14 mm. long, septate .. ..

2. *L. heteranthus.*

Leaves elliptic or obovate, obtuse, 4—6 cm. long; petals very thick; anthers 8 mm. long, septate .. ..

3. *L. crassipetalus.*

Racemes not involucrate or sunk in a protuberance of the branchlet; style articulate (Subsect. 3.

LANTHORUS) .. ..

4. *L. pentapetalus.*

Petals 4 (Sect. II. PHENICANTHEMUM).

Racemes 5—7 cm. long, rusty-pubescent; style not articulate .. ..

5. *L. coccineus.*

Flowers in sessile clusters; petals 4 (Sect. III. BARATRANTHUS).

Heads always axillary (Subsect. I. CYATHISCUS) ..

6. *L. productus.*

Heads rarely axillary, usually opposite in clusters on the internodes (Subsect. 2. EUBARATRANTHUS) ..

7. *L. Lobbii.*

Corolla gamopetalous (Subgenus II. DENDROPHTHOE) ..

Corolla 4-lobed; fruit more or less pearshaped (Sect I. CICHLANTHUS). [septate.

Fruit more or less stalked, pyriform; anthers not

Fruit gradually contracted into the stalk; flowers usually single or in few-flowered racemes; leaves more or less oblong .. ..

8. *L. obtectus.*

Fruit truncate at top, less gradually contracted; flowers in densely fascicled cymes; leaves elliptic, tomentose beneath .. ..

9. *L. ferrugineus.*

Fruit abruptly contracted into a slender stalk; flowers in few-flowered cymes; leaves elliptic, glabrous when old beneath .. ..

10. *L. malaccensis.*

Fruit not stalked, oblong, rugose; flowers in pairs or threes in umbellate cymes; anthers septate ..

11. *L. estipitatus.*

Corolla 5-lobed; fruit ovoid (Sect. II EUDENDROPHTHOE).

Branchlets, leaves beneath and inflorescence with orange rusty tomentum, leaves ovate lanceolate, acuminate, 8—13 cm long; corolla inflated in the middle, 4 cm. long; racemes 2.5 cm. long.. ..

12. *L. Casuarine.*

Branchlets and leaves beneath glabrous; inflorescence sometimes puberulous or furfuraceous.

Racemes under 1.5 cm. long, furfuraceous; corolla

- funnel-shaped, under 2 cm. long; leaves very coriaceous .. .. 13. *L. crassus*.
- Racemes 2—3 cm. long, grey-pubescent; corolla ventricose at base, 1.5—2 cm. long; leaves thickly coriaceous .. .. 14. *L. pentandrus*.
- Racemes 4—7 cm. long, glabrous; corolla gradually enlarging, 4 cm. long; leaves coriaceous .. 15. *L. longiflorus*.
- Racemes 6—10 cm. long, glabrous; corolla inflated above the middle, 6—8 cm. long; leaves very coriaceous, large. .. .. 16. *L. grandifrons*.
- Corolla 6-lobed; fruit cylindric.
- Pedicels 1-flowered (Sect. III. KINGELLA).
- Leaves oblong, over 18 cm. long; corolla 10 cm. long; anthers 8—10 mm. long .. .. 17. *L. Scortechinii*.
- Pedicels 2-flowered (Sect. IV. ARCULUS).
- Leaves elliptic, under 8 cm. long; corolla 4—5 cm. long; anthers 2 mm. long .. .. 18. *L. Duthieanus*.

1. *LORANTHUS PULCHER*, DC. Prodr. IV. 295 (1830). A large parasitic shrub growing in large masses on the stems of trees and reaching 6—8 ft. or more in height; branchlets robust, terete, with greenish-grey, shining papery bark, uppermost angular; lenticels elongate, leafscars very prominent. *Leaves* opposite or subopposite, sometimes whorled, very coriaceous, glabrous; lanceolate, ovate or elliptic oblong, long-acuminate at apex, acute to rounded at base; upper surface dark green, lower paler, both light olive-brown when dry and minutely impressed punctate; margin recurved; 8—20 cm. long, 2—8 cm. broad; midrib stout; main nerves about 6—10 pairs, nearly horizontal, short and interarching near the margin, rarely visible; petiole stout, variable, 5—20 mm. long. *Racemes* or spikes subterminal or axillary, solitary or fascicled, densely-flowered from base to point, 10—30 cm. long; the bases surrounded by an involucre of linear tawny scales; rhachis stout; pedicels thick, up to 3 mm. long; bract boat-shaped, acute and ciliate at apex. *Calyx* urceolate, 2—3 mm. long; limb annular. *Corolla* in bud 8 mm. long, constricted in the middle; petals 5, red or the tips yellowish, linear oblong, acute at tip, recurved when open from the middle, the upper part above the stamens having, beneath the thin inner epidermis, a layer of long narrow unicellular hairs, otherwise glabrous. *Stamens* inserted on the middle of the petals with a rugosity below them; filaments flat, 1—2 mm. long; anthers 2 mm. long, the inner valves of the cells shorter than the outer which are curved at the top. *Ovary* short; style somewhat stout, 6 mm. long; stigma hardly capitate. *Fruit* subcylindric, truncate at apex, 5—6 mm. long, pericarp greenish-sticky within. *Seed* toothed at

tip, embryo minute. Hook. f. in Fl. Br. Ind. V. 205; King in Journ. As. Soc. Beng. lvi. ii. 90. *L. speciosus*, Wall. Cat. 578. *L. coccineus*, Hook. Bot. Misc. t. 58 (not of p. 278). *Dendrophthoe pulcher*, Miq. Fl. Ind. Bat. I. i. 821. *Chiridium speciosum*, van Tieghem in Bull. Soc. Bot. Fr. XLI. 541.

SIAMESE STATES: Setub, Ridley 14923!. KEDAH: Rawei island, Ridley 15704!. PENANG: Porter (Wallich 578)!; Phillips!; at 90—300 m. alt., King's Collector 2281!, 4868!; Curtis 394!; on Penang Hill, Ridley 9390!. PERAK: at Sungie Larut, etc., Wray 2296!, 3225!; on hills up to 1200 m. alt., King's Collector 6257!, 6407!, 10540!. PAHANG: at Tahan river, Ridley 2410! (leaves very shining and thinner).

*L. puniceus*, Wall. Cat. 522; Hook. f. Fl. Br. Ind. V. 223 seems to be this species and was identified with it, in the Calcutta Herbarium, by the late Sir George King.

var. *Parishii*. Leaves linear lanceolate, verticilled at the summit. Racemes subterminal in the axils of the whorl of leaves. *L. Parishii*, Hook. f. in Fl. Br. Ind. V. 205. *L. perakensis*, Engl. in Engl. & Prantl Nachtr. 129. *Chiridium verticillatum*, van Tieghem in Bull. Soc. Bot. Fr. XLI, 541.

PERAK: *Scortechini* 231!; at Larut at about 300 m. alt., King's Collector 6278!. SELANGOR: at Bukit Kutu, Ridley 7617!.—DISTRIB. Tenasserim (*Parish* 3005!); Siam (*Kerr* 1763!)

2. LORANTHUS HETERANTHUS, Wall. Cat. 537 (1828). A stout parasitic shrub reaching 3 m. or more in height, nearly glabrous; branchlets stout, terete, dark brown or nearly black, older shining; leaf and raceme scars very prominent. Leaves coriaceous, alternate or opposite; elliptic or oblong-lanceolate or linear-lanceolate, obtusely acute at apex, attenuate at base; both surfaces glabrous, upper shining and obliquely striolate, lower dull, pale yellowish-brown when dry; margins subsinuous, recurved; 7—13 cm. long, 2—5 cm. broad; midrib rather slender, raised on both surfaces; main nerves about 10 pairs, joined in loops near the margin, obscure as is the reticulation; petiole stout, 2—3 cm. long, easily disarticulated. Racemes solitary or 2—3 together, terminal and axillary, the base more or less immersed in the branchlets, surrounded by a shallow cup, often curved, red, rusty-puberulous when young, up to 17 cm. long, very sparsely flowered; rhachis angular; pedicels stout, at right angles to rhachis, about 1 cm. long; bract lateral, boatshaped, concave, ciliate; flowers in bud curved upwards, very slender, acute, about 3—4 cm. long. Calyx cylindric, 7—8 mm. long, striate, limb slightly spreading, entire.

*Petals* 5—6, linear, crimson, 2—3 cm. long, about 1 mm. broad, base rather broader, upper part reflexed in flower, epidermis on inner side thin with a layer of long unicellular hairs beneath. *Stamens* inserted near the base of the petals, very slender, apiculate; filaments 3—4 mm. long; anthers 13—14 mm. long; cells 2, marginal, conspicuously transversely septate. *Ovary* cylindric; style filiform, angular, rugose, nearly 2 cm. long; stigma simple. *Fruit* urceolate, glabrous, striate, 9 mm. long, 5 mm. in diam.; seed obovoid; embryo slender. DC. Prodr. V. 306; Hook. f. Fl. Br. Ind. V. 208; King in Journ. As. Soc. Beng. LVI. ii. 91; Brandis Ind. Trees 548; Prain Beng. Plants 911; Koord. Exkurs. Fl. Jav. II. 157. *L. eleutheropetalus*, Kurz in Journ. As. Soc. Beng. XL. ii. 64 and For. Fl. II. 321. *Dendrophthoe macrocalyx*, Miq. Fl. Ind. Bat. I. i, 821. *Coleobotrys heterantha*, van Tiegh. Bull. Soc. Bot. Fr. XVI. 542.

KEDAH: on Kedah Peak, 900 m. alt., *Ridley* 5484!. PERAK: at Haram Purah, *Scortechini* 860!; up to 1000 m. alt., *Wray* 1172!, 3234!; on trees near Larut at 750—1000 m. alt., *King's Collector* 6362!; at Temango on Durians, *Ridley* 14566!. PAHANG: at Kwala Pahang, *Ridley* 1809!.—DISTRIB. India (Chittagong), Burma, Siam (*Schmidt* 695!), Java, Borneo (*Haviland*), Sumatra (*Forbes* 2867!).

3. LORANTHUS CRASSIPETALUS, King in Journ. As. Soc. Beng. LVI. ii. 91 (1887). A parasitic shrub; branchlets very stout, striate with lines from below the leaves or leafscars; bark shining, nearly black when dry. *Leaves* coriaceous, alternate; elliptic or obovate, obtuse at apex, attenuate at base; glabrous, striolate, upper surface shining, lower dull; margins recurved; 4—10 cm. long, 2—5 cm. broad; midrib slightly prominent; main nerves invisible when fresh, obscure when dry as is the reticulation; petiole 5—7 mm. long, stout. *Racemes* solitary or in pairs, axillary, stout, rigid, erect, sparsely many-flowered, 5—15 cm. long, the base enclosed in a thick walled hollow in the branchlet, and subtended by an orbicular ciliate involucre scale: rhachis angular, striate, slightly puberulous; pedicels stout, at about 60° with the rhachis, 2—5 mm. long; bract broad, cochleate, continuing the pedicel and half embracing the calyx tube; flowers erect, nearly parallel to the rhachis, the corolla in bud narrowly conical. *Calyx*-tube cylindric, 5—7 mm. long, striate, slightly puberulous; limb spreading, cupshaped, truncate, with a wavy margin, 1—1.5 mm. long. *Petals* 5, linear, very thick, acute at tip, smooth and yellowish externally, ridged and bright red internally, 18—22 mm. long, the inner epidermis layer covering a layer of linear unicellular hairs. *Stamens* very slender, inserted about  $\frac{1}{3}$  up



the petal: filaments quadrangular, 2—5 mm. long; anthers 8 mm. long with two very narrow transversely septate cells. *Ovary* cylindric; style filiform, quadrangular, rugose; stigma minute. *Fruit* not known. *Coleobotrys crassisejala*, van. Tiegh. in Bull. Soc. Bot. Fr. XLI 542?

PERAK: on Gunong Idjou, *Scortechini* 363!, 521; camp on Ulu Batang Padang, 1500 m. alt., *Wray* 1507!; Larut Hills, *Rilley*!

Ridley's specimen in Herb. Singap. has the same flowers, but the leaves are larger and the racemes longer than in the other ones.

4. *LORANTHUS PENTAPETALUS*, Roxb. Fl. Ind. ed. Carey and Wall. II. 211 (1824). A large much branching parasitic shrub reaching 90—120 cm. in height; branchlets stout, terete, with dark blackish grey bark, glabrous, the youngest alternately compressed. *Leaves* coriaceous, opposite or sometimes alternate; ovate or ovate-lanceolate, sometimes elliptic or suborbicular, acute or acuminate, often obliquely, at apex, rounded or attenuate at base; both surfaces dark green and glabrous when fresh, the uppermost with purplish margins, nearly black when dry; 6—12 cm. long, 2—7 cm. broad; midrib stout, prominent beneath; main nerves about 6—8 pairs, very faint; reticulation irregular, obscure; petiole 1—2 cm. long, rather slender, furrowed. *Racemes* solitary or in pairs or threes from the axils of the leaves or of fallen leaves, 10—20 cm. long, all parts bright red in colour except the yellow tips of the petals, flower bearing almost to the base which is sunk in a circular protuberance of the branchlets; rhachis glabrous or slightly puberulous, slightly angular; pedicels very short, thick, at right angles to the rhachis, the flowers ascending so as, at first at any rate, to be parallel to the rhachis; bract ovate, acute, ciliate, appressed to the calyx tube; flowers in bud constricted in the middle, the basal part nearly globose. *Calyx* cylindric, 2—3 mm. long, the limb obscurely toothed. *Petals* 5, the basal portion obovate, thick, glabrous and convex within, the neck transversely rugose, the upper portion ligulate, acute, reflexed in flower, the whole 6 mm. long. *Stamens* inserted above the neck of the petals; filaments broad, 1—2 mm. long; anthers elliptic, 1 mm. long, the inner valve of each cell shorter than the outer. *Ovary* shortly cylindric; style slender, 5 mm. long, jointed in the middle, rugose, the lower half 4—5-angled, the upper slender; stigma small, subtruncate. *Fruit* crimson, ellipsoid, truncate at apex, 7 mm. long, 5 mm. in diam., seed obovoid. Roxb. Fl. Ind. I, 553; DC. Prodr. IV. 295; Wall. Pl. As. Rar. III. t. 225 and Cat. 503; Griff. Notul. IV. 617 and Ic. Pl. Asiat. tt. 624, 625; Blume Fl. Jav. Loranth. 39, tt. 14,



23 A; Kurz For. Fl. II. 322; Korth. Verh. Lor. 66; Hook. f. Fl. Br. Ind. V. 206; King in Journ. As. Soc. Beng. LVI. ii. 90; Engl. in Engl. & Prantl Naturl. Pflanzenfam. III. i. 185; Prain Beng. Plants 911; Brandis Ind. Trees 548; Koord. Exkurs. Fl. Jav. II. 158. *L. polycarpus*, Wall. Cat. 540. *L. erythrostachys*, Wall. MS. *Phaenicanthemum pentapetalum*, Miq. Fl. Ind. Bat. I. i. 823. *Dendrophloe pentapetala*, G. Don Gen. Syst. III. 419. *Lanthorus pentapetalus*, van Tiegh. in Bull. Soc. Bot. Fr. XLI. 488.

PENANG: Government Hill, Maingay K.D. 691!, 692!; Curtis 205!; on trees at 300—750 m. alt., King's Collector 1522!; Hullett 167!; Ridley 9364!, 10780!. PERAK: on tree branches about Larut and Goping up to 900 m. alt., King's Collector 4227!, 4377!; on Gunong Batu Putih, 1000—1300 m. alt., Wray 406!, 466!, at the Cottage, Larut, 1300 m., Wray 4240!; Scortechini 390!; Ridley 2968!. SELANGOR: at Ginting Bidai, 600 m. alt., Ridley 7619!. MALACCA: Griffith K.D. 2724!, 2725!: at Serkam, Derry 1098!; Hervey!. PAHANG: at Pekan, Ridley 1072!. SINGAPORE: Lobb 327!.—DISTRIB. India (E. Himalaya, Assam, E. Bengal), Burma, Java, Sumatra, Borneo (at Kuching Ridley 11666!; Haviland), Siam (Murton 65!, Kerr 619!).

5. *LORANTHUS COCCINEUS*, Jack in Mal. Misc. I. 8 (1820). A parasitic shrub, reaching 90—120 cm. in height; branchlets stout, terete, light to dark brown, uppermost rusty or scurfy tomentose as are the innovations. Leaves coriaceous, alternate or subopposite; ovate or ovate-lanceolate, obtusely acute at apex, rounded or cordate at base; both surfaces glabrous or slightly puberulous, dark olive-green when dry; 6—12 cm. long, 3—7 cm. broad; midrib stout, prominent beneath; main nerves 5—7 pairs, curving and meeting in loops towards the margin; reticulation irregular; petiole 10—15 mm. long moderately stout. Racemes axillary, solitary or in pairs, stellately rusty-pubescent, 5—7 cm. long, erect or somewhat spreading, flower-bearing throughout; rachis striate; pedicels very short, thick, nearly at right angles to the rachis, the flowers sideways inserted so as, at first at any rate, to be closely parallel to the rachis; bract cucullate, ovate, closely appressed to the calyx-tube; flowers in bud slightly constricted in the middle, 5—7 mm. long. Calyx cylindric, slightly constricted below the annular obscurely 4-lobed limb, 1—2 mm. long. Petals 4, crimson, the basal portion ovate, glabrous within, the neck and ligulate upper portion with frilled margins, the whole 5—7 mm. long, the upper parts reflexed in flower. Stamens inserted at the

neck of the petals; filaments flat, 2 mm. long; anthers oblong, obtuse, the cells very narrow, marginal, separated by a broad connective. *Ovary* ovoid, 4-angled, the neck narrowed; style slender, 4-sided, not jointed; stigma large, reniform, capitate. *Fruit* reddish-brown, obtusely 4-angled, flask-shaped, truncate at tip, 8 mm. long; seed 4-angled. Hook. Bot. Misc. I. 278 (*excl.* t. 58); Roxb. Fl. Ind. Ed. Carey and Wall. II. 215; DC. Prod. IV. 296; Griff. Notul. IV. 620 and Ic. Pl. Asiat. t. 626; Kurz For. Fl. II. 322; Korth. Verh. Lor. 68; Hook. f. Fl. Br. Ind. V. 206; King in Journ. As. Soc. Beng. LVI. ii. 91; Brandis Ind. Trees 549. *L. racemiferus*, Wall. Cat. 539; DC. l.c. *Phoenicanthemum coccineum*, Miq. Fl. Ind. Bat. I. 825; van Tiegh. in Bull. Soc. Bot. Fr. XLI. 544. *P. Bennettianum*, Miq. l.c. 826. *Dendrophthoe coccineus*, G. Don Gen. Syst. III. 419. *D. ? racemiferus*, G. Don. l.c.

PENANG: on trees at 250—300 m. alt., *King's Collector* 4914!; Government Hill, *Curtis* 243!. PERAK: at Waterfall Hill, etc., 250 m. alt. *Wray* 2582!, 3270!; *Scortechini* 261!; on trees near Larut and Goping, *King's Collector* 1017!, 2323!, 8124!, 10524!. PAHANG: at Kwala Pahang, *Ridley* 1427!. SELANGOR: at Labu river, *Ridley* 7616!. MALACCA: *Griffith* K.D. 2718!; *Maingay* K.D. 690!; at Bukit Senggeh, *Goodenough* 1453!. JOHORE: at Bukit Kayara, *Ridley* 11340!. SINGAPORE: at Bukit Mandai, *Ridley's Collector* 6697!.—DISTRIB. India (Cachar), Burma, Andamans, Borneo (at Kuching *Haviland* 472!), Bangka.

6. LORANTHUS PRODUCTUS, King in Journ. As. Soc. Beng. LVI. ii. 91 (1887). A parasitic glabrous shrub with long branches; branchlets strongly 4-angled, slightly flattened especially at the nodes, dark brown to nearly black when dry. *Leaves* coriaceous, opposite; lanceolate or ovate, obtusely acute at apex, cuneately attenuate, often unequally, at base; blue-green when fresh, black-brown when dry and much wrinkled on both surfaces; margins subsinuate, recurved; 6—12 cm. long, 3—6 cm. broad; midrib stout, prominent on both surfaces; main nerves 3—8, very irregular, curving to and along the margin and joined in loops; reticulation obscure; petiole stout, 7—15 mm. long, bordered by the decurrent margins of the blade. *Flowers* crowded in axillary clusters, sessile; bract a short cylindric obscurely 2—4-crenate tube 4 mm. long, enveloping the calyx-tube; flowers in bud clavate about 1 cm. long. *Calyx*-tube very short; limb cylindric, truncate, dentate, ciliate on the margins, 4—5 mm. long. *Petals* 4, free, linear-oblong, acute, thick, 10—13

mm. long, reflexed in flower from about the middle, margins of slightly enlarged base ciliate. *Stamens* inserted a little below the middle of the petal, which is rugose below them; filaments broad, 4 mm. long; anthers about 3—4 mm. long, curved when mature; cells parallel, introrse, transversely septately pitted in a double row of cells, inner valves shorter than outer. *Ovary* ovoid; style linear, angled, rugose, slightly geniculate a little below the middle; stigma small, truncate. *Fruit* globose, 6—8 mm. in diam., smooth, crowned by the persistent rather long cylindric calyx-limb and enveloped at base by the persistent bract which forms a flattened cup; seed obovoid, surrounded except at the base by the sticky gum, embryo linear. *Cyathiscus productus*, van Tiegh. in Bull. Soc. Bot. Fr. XLI. 539.

PERAK: *Scortechini* 391!, 581!; camp on Ulu Badang Padang, 1500 m. alt., *Wray* 1531!, 2949!; near Larut at 1000—1200 m. alt., *King's Collector* 3240!.

7. *LOBRANTHUS LOBBII*, Hook. f. in Fl. Br. Ind. V. 204 (1886). A parasitic shrub; branchlets terete with pale greyish-brown obscurely puberulous scaly bark, innovations ferruginous-pubescent. *Leaves* opposite, thickly coriaceous, glabrous; ovate-lanceolate, acuminate at apex, rounded or acute at base; when fresh dark green above, brownish-green beneath, both surfaces nearly black when dry and minutely impressed-punctate through contraction of the tissues; 5—15 cm. long, 2—6 cm. broad; midrib thick, main nerves about 4—6 pairs rarely at all visible; petiole none or up to 7 mm. long, thick. *Flowers* pale yellow, minute, sessile, clustered on a thickened cushion-like peduncle, 6—20 in each cluster, the clusters in opposite pairs in the axils of the leaves or in whorls at intervals along the internodes; bract scale-like. *Calyx* tubular, rusty-pubescent, 2 mm. long, the limb very faintly toothed. *Petals* 4, free, linear-oblong, thick, puberulous, 4 mm. long. *Stamens* minute, inserted above the middle of the petals; anthers 1 mm. long, filaments as long. *Ovary* globose; style very short; stigma cylindric, papillose, 3 mm. long, obtuse and obscurely 4-lobed at apex. *Fruit* brown, ellipsoid, 4—5 mm. long, puberulous, tipped with the remains of the calyx-limb. *King* in Journ. As. Soc. Beng. LVI. ii. 90. *Baratranthus Lobbi*, *Kingii*, *Scortechinii*, *bicolor*, van Tiegh. in Bull. Soc. Bot. Fr. XLI. 537.

KEDAH: on Kedah peak, *Ridley* 5486!. PENANG: *Lobb* 338!; *Maingay* K.D. 695/2!; at 600—750 m. alt., *King's Collector* 1318!, 1695!; on Government Hill, *Curtis* 85!; 389!; Balik Pulau Road,

*Ridley* 8020!; on Penang hill, *Ridley* 10183!. PERAK: on trees on the hills about Larut, Goping, etc., up to 1500 m. alt., *King's Collector* 2643!, 4486!, 5011!, 6294!, 8061!, 11024!; *Scortechinii*!; at lower camp and to the summit of Gunong Batu Putih, 1000—2000 m. alt., *Wray* 357!, 933!, 1018!, 2521!; at Gunong Hijan, *Ridley* 2969!. SELANGOR: at Samangko Pass, *Ridley*, 2058!. PAHANG: at Tahan river, *Ridley* 2251!; at Gunong Tahan, *Wray & Robinson* 5485!; *Ridley* 16095!. JOHORE: at Kukub, *Ridley* 13261!. SINGAPORE: at Changi and Chanchukang, *Ridley*!.

Van Tieghem in his paper in the Bulletin of the Société Botanique de France, Vol. XLI. 533 entitled 'Quelques compléments à l'étude des Loranthées à calice dialysépale et anthères basifixes' has expressed the opinion that there are four species distinct from each other in the material arranged and distributed by Sir G. King after writing his paper on the species of *Loranthus* indigenous in Perak. They are thus characterized and separated:

- |  |   |
|--|---|
| Leaves sessile .. ..   | 1. <i>Baratranthus Lobbii</i> .   |
| Leaves petiolate, broad, often unequal-sided, their surfaces similar, their lateral nerves visible even on the upper surface .. .. | 2. <i>Baratranthus Kingii</i><br>( <i>King's Collector</i> 2643, 6294).   |
| Leaves petiolate, their surfaces similar, their lateral nerves not visible .. ..   | 3. <i>Baratranthus Scortechinii</i><br>( <i>Scortechinii</i> —no number). |
| Leaves petiolate, their surfaces dissimilar the lower being reddish yellow .. ..   | 4. <i>Baratranthus bicolor</i><br>( <i>King's Collector</i> 4486, 11024). |

The question of absence of petiole in *L. Lobbii* is not borne out by the specimens quoted by Hooker in the Fl. Br. Ind., for both Maingay's and Curtis' specimens show short petioles. The other characters quoted do not seem to be constant so I prefer to leave the material as sorted by Sir George King and not to attempt a subdivision which I do not myself believe to be warranted.

8. *LORANTHUS OBTECTUS*, Wall. Cat. 534 (1828). A parasitic shrub with slender pendulous branches; branchlets slender, terete, greyish-brown, shining, with small raised lenticels, uppermost with innovations and inflorescence thickly covered with a tomentum of rusty-red, mossy, jointed hairs. *Leaves* chartaceous, opposite or sub-opposite; ovate-lanceolate or elliptic-oblong, obtusely acute at apex, rounded or cordate at base; both surfaces blackish-brown when dry, upper smooth, glabrous when mature, lower also glabrous except the midrib when old, thickly rusty-tomentose when young; 3—8 cm. long, 1.5—5 cm. broad; midrib slender, main nerves 7—8 pairs, irregular, joined in arches towards the margin; reticulation fairly

prominent in a dry state; petiole rather thick, 4—5 mm. long, tomentose. *Flowers* in axillary fascicles, single or in short few-flowered racemes about as long as the petiole, densely mossy-tomentose; pedicels short; bract ovate, obtuse, 1—2 mm. long, clasping the base of the calyx tube. *Calyx*-tube obovoid, 5—6 mm. long; limb stout, constricted at the mouth. *Corolla*-tube in bud slender, curved, clavate, the tip obtuse, 10—12 mm. long, when open cleft about half-way down on one side; lobes 4, short, obtuse, thick. *Stamens* 4; anthers 1 mm. long, apiculate; filaments as long or slightly longer, flat. *Ovary* obovoid; style slender, 4-angled; stigma scarcely capitate. *Fruit* pyriform, the stalk gradually attenuate downwards, the mouth contracted, about 1 cm. long. DC. Prodr. IV. 299. *L. Scurrula*, L. var. *obtecta*, Kurz For. Fl. II. 319; Hook. f. Fl. Br. Ind. V. 209. *L. Scurrula*, L. var. *laevigata*, Hook. f. l.c. *Dendrophthoe obtectus*, G. Don Gen. Syst. III. 419.

TRANG: on branches of trees on low ground, *King's Collector* (*Kunsiler*) 1418!. PERAK: Maxwell's hill, 1500 m. alt., *Fox* 120!. MALACCA: *Griffith* K. D. 2733!, 2735!; at Bukit Senggeh, *Goodenough* 1833!. JOHORE: at Kota Tinggyi, etc., *Ridley* 4212!, 11031!.—DISTRIB. Burma.

The Malay *L. obtectus*, Wall., seems to me to be distinct from the Indian *L. Scurrula* so I have thought it best to retain Wallich's name instead of describing the material under *L. Scurrula* var. *obtecta* as is done in the Fl. Br. Ind. It comes very near *L. Schultesii*, Blume of Java. I have carefully examined the original specimens of *L. Scurrula*, Linn. Sp. Pl. Ed. II. 472 now in the possession of the Linnean Society, and consider that the Malay specimens now under consideration do not agree with it. The leaves have a different shape, the flowers are rather larger and the fruit is less truncate while all the parts are more conspicuously tomentose.

9. *LORANTHUS FERRUGINEUS*, Roxb. Fl. Ind. ed. Carey & Wall. II. 207 (1824). A parasitic shrub with long pendulous branches; branchlets terete, moderately slender, the bark greyish-brown, minutely lenticellate, uppermost parts, like the under surface of the leaves, the innovations and the inflorescence covered with dense ferruginous mossy tomentum of jointed squarrose hairs. *Leaves* opposite or sub-opposite, coriaceous; uniform in shape, elliptic, very obtusely acute at apex, rounded at base; upper surface dark brown or black when dry; 4—10 cm. long, 2—6 cm. broad; midrib slender, often zigzag; main nerves 5—8 pairs, irregular, branching and joined in loops towards the margin; reticulation obscure; petiole 7—8 mm. long, rough, channelled above. *Flowers* in axillary fascicles of few-



(2—6-) flowered cymes as long as or slightly longer than the petioles; pedicels slender, short; bract ovate embracing the base of the turbinate calyx-tube. *Calyx*-tube 4—5 mm. long, limb short, ciliate. *Corolla* variable in length, 10—20 mm. long, in bud clavate, when open cleft on one side half way down, green or grey inside; lobes 4, obtuse, glabrous within. *Stamens* 4, anthers oblong, 1—1.5 mm. long; filaments broad, 1.5—2.5 mm. long. *Ovary* cylindric; style slender, 4-angled, slightly bent near the top; stigma subrotund. *Fruit* ovoid-pyriform, densely mossy-tomentose, truncate at top. Roxb. Fl. Ind. I. 551 and II. 188 (*ferruginosus*); DC. Prodr. IV. 299; Wall. Cat. 500; Jack in Mal. Misc. I. 9 and in Hook. Bot. Misc. I. 279, t. 59; Hook. f. Fl. Br. Ind. V. 210; King in Journ. As. Soc. Beng. LVI. ii. 92; Koord. Exkurs. Fl. Jav. II. 159. *Dendrophthoe ferruginea*, G. Don Gen. Syst. III. 420; Miq. Fl. Ind. Bat. I. i. 812. *Cichlanthus ferrugineus*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 253.

PENANG: Wallich 500!; Phillips!; at Waterfall, Curtis 2640!, G. King!; Kurz!; Penang Hill, Ridley 10782, etc.!; John Scott!; Deschamps!. PERAK: at Changkat Serdang, Wray 745!; Scortechini 22!, 630!, 2099!. PAHANG: at Katapong, near Pekan, Ridley 1234!. MALACCA: Griffith K. D. 2727!; Maingay K. D. 686; Cuming 2257!; Hervey!; Hullett 399!; Ridley 10755!. SINGAPORE: King's Collector 1139!; Ridley!; Murton 137!.—DISTRIB. Java, Sumatra.

10. *LOBANTHUS MALACCENSIS*, Hook. f. in Fl. Br. Ind. V. 210 (1886). A parasitic shrub reaching 60—90 cm. in height; branchlets brownish-grey, terete, closely lenticellate with small pale rounded lenticels, uppermost slender, scurfily rusty-pubescent. *Leaves* thinly coriaceous, opposite or subopposite; elliptic or ovate-elliptic, obtusely acute at apex as at base; both surfaces dark brown when dry, almost shining above, puberulous when young, glabrous when old except the midrib; 3—6 cm. long, 2—4 cm. broad; midrib slender, rusty-pubescent; main nerves 4—6 pairs, irregular, meeting in arches towards the margin, reticulation otherwise obscure; petiole slender, rusty-puberulous, 6—10 mm. long. *Flowers* in axillary few- (about 5-) flowered rusty-pubescent cymes as long as the petiole; pedicels short, slender; bract ovate, minute, 1 cm. or more below the base of the *calyx*-tube which is pyriform and 2—3 mm. long, the limb truncate, contracted. *Corolla* brown in bud, slender, clavate, 10—11 mm. long, when open one side split about half way down; lobes 4, acute, short. *Stamens* 4, anthers oblong, .5—1 mm. long, shortly apiculate; filaments rather longer. *Ovary* ovoid; style slender, 4-



sided, stigma subcapitate. *Fruit* reddish-brown, obconic, rather abruptly contracted into a slender stalk, scurfily rusty-pubescent, about 8 mm. long in all. King in Journ. As. Soc. Beng. LVI. ii. 93.

PENANG: on tree-branches at 600—750 m. alt., *King's Collector* (Kunstler) 1308!. PERAK: on high trees at 900—1200 m. alt., *King's Collector* 6286!; *Scortechini* 311!; 647! SELANGOR: at Ginting Bidai, *Ridley*! PAHANG: at Katapong, *Ridley* 1232!. MALACCA: *Griffith* 2711!

11. *LORANTHUS ESTIPITATUS*, Stapf in Trans. Linn. Soc. Ser. 2 IV. 221 (1894). A parasitic shrub; branchlets slender, brown, rough with many small circular whitish lenticels, uppermost and innovations rusty and scurfily pubescent. *Leaves* thinly subcoriaceous, subopposite; elliptic or suborbicular, obtuse or emarginate at apex, shortly cuneate at base; upper surface glabrous, lower glabrous when old, when young densely rufous-tomentose; 3·5—5·5 cm. long, 2·5—5 cm. broad; midrib slender, main nerves 3—4 pairs, irregular, meeting in arches near the margin; reticulation obscure; petiole slender, 8—10 mm. long. *Flowers* in an umbellate cyme in pairs or threes on a common slender peduncle 8—10 mm. long, single or fascicled in the axils of the leaves, rufous-tomentose as the whole inflorescence; pedicels slender, 7 mm. long; bract very small, ovate, embracing the calyx-tube. *Calyx* ovoid or nearly globose; limb very short, ciliolate. *Corolla*-tube in bud very slender, curved, clavate, 10—24 mm. long, glabrous within, the tip ovoid, when open cleft into 4 lobes, one of the clefts extending about to the middle of the tube. *Stamens* inserted near the top of the tube; filaments adnate to the tube below, free only for about 1 cm.; anthers oblong, 2—2·5 mm. long, obtuse, cells transversely septate. *Ovary* included in the calyx-tube; style very slender, 4-angled, stigma clavate. *Fruit* oblong, 7 mm. long, 4 mm. in diam., glabrous, prominently rugose, not stalked.

PERAK: *Scortechini* 421!, at Gunong Haram 647!.—DISTRIB. Borneo (*Fraser* 183!; Kinabalu Mt. *Haviland* 1351!).

*Scortechini* 421 was identified by Sir George King with *L. Scurrula*, L. var. *obtecta*, but Dr. O. Stapf in his paper on the Flora of Kinabalu in Borneo, rightly pointed out that the fruit is quite different, being oblong and not clavate. He, like Sir G. King, makes *Scortechini* 311 the same, but that specimen seems to me to differ very much and to belong to *L. malaccensis*.

12. *LORANTHUS CASUARINÆ*, Ridley in Trans. Linn. Soc. 2nd Ser. III. 342 (1893). A parasitic shrub; branchlets stout, smooth, with

dark brown lenticellate bark, the younger ones and other parts covered with a rusty orange-coloured (when fresh) tomentum. *Leaves* fleshy, opposite; ovate-lanceolate, acuminate at apex, rounded or subcordate at base; upper surface glabrous, lower covered with a rusty tomentum; 8—13 cm. long, 4—5 cm. broad; midrib stout, raised on both surfaces; main nerves about 5—6 pairs, very obscure as is the reticulation; petiole 5—6 mm. long. *Flowers* in axillary racemes about 2.5 cm. long, covered with a ferruginous tomentum of branched multicellular hairs; bract lanceolate, acuminate, 12 mm. long. *Calyx*-tube short, cylindric, somewhat compressed in the middle, limb scarcely any. *Corolla*-tube curved, narrowed a little above the base then dilated and again slightly narrowed below the mouth, 4 cm. long, cleft on one side to about the middle, glabrous within; lobes 5, linear, curved, 10—12 mm. long. *Stamens* 5; anthers linear, apiculate, 3—4 mm. long; filaments slender, 5 mm. long. *Ovary* ovoid; style slender, longer than the stamens; stigma subclavate. *Fruit* (immature) lageniform, densely rusty tomentose without, 8—10 mm. long.

PAHANG: on *Casuarina equisetifolia*, Forst, at Sungei Meang. Ridley 1526!.

13. *LORANTHUS CRASSUS*, Hook. f. in Fl. Br. Ind. V. 217 (1886). A parasitic shrub; branchlets stout, the younger ones with smooth grey bark and few lenticels, the older ones rough with many lenticels; nodes swollen. *Leaves* very thickly coriaceous, opposite subopposite or alternate, very variable in shape; elliptic, ovate-oblong or oblong-lanceolate, sometimes nearly orbicular, obtusely acute at apex, rounded or attenuate at base; both surfaces dark brown and opaque when dry; 8—18 cm. long, 4—10 cm. broad; midrib very stout especially at base, raised on both surfaces; main nerves irregular, 5—6 pairs, distinct when dry, curving upwards to disappear near the margin; reticulation not visible; petiole very stout, 5—7 mm. long. *Flowers* in axillary racemes up to 12 mm. long; the racemes about 5—6-flowered, densely furfuraceous; pedicels very short, stout; bracts ovate, acute, 1—2 mm. long. *Calyx*-tube globose or urceolate, the limb truncate, faintly lobed. *Corolla* straight, funnel-shaped, not or only very slightly split on one side, 17—18 mm. long, equally cleft to a little below the middle into 5 linear lobes, reflexed for half their length. *Stamens* 5; anthers linear, 2—3.5 mm. long, as long as the stellately puberulous filaments. *Ovary* ovoid; style slender, nearly as long as the corolla-lobes; stigma large, capitate.

*Fruit* ovoid-oblong, 8—10 mm. long, puberulous without, crowned by the cupular persistent calyx-limb. Ridley in Journ. Str. Br. R. As. Soc. LIX. 165. *L. retusus*, Wall. Cat. 504, in part only.

KEDAH: Lankawi island *Curtis* 2641! Vern. 'Bendalu apia'; on *Dacrydium*, the leaves red, Gunong Jerai, *Ridley*. SINGAPORE: *Wallich* 504! (in part only); at Changi, *Ridley* 1933!; in gardens *Ridley* 8064!, 8901; at Bukit Mandi, *Ridley*!.

14. *LORANTHUS PENTANDRUS* Linn. Mant. 63 (1767). A parasitic shrub, reaching a considerable size even to 3—4 m. in height, branches stout; branchlets rather stout, terete, grey, shining, uppermost puberulous. *Leaves* thickly coriaceous, subopposite, or alternate; variable in shape, lanceolate or ovate-elliptic to nearly orbicular, obtuse to acute at apex, broadly attenuate to cuneate at base; both surfaces glabrous, dark brown or almost black when dry; 5—15 cm. long, 3—10 cm. broad; midrib stout, prominent, wavy; main nerves 3—5 pairs, faint; reticulation not visible; petiole stout, 6—10 mm. long, bordered above by the decurrent margins of the blade. *Flowers* in axillary, sometimes fascicled, scurfy, grey-pubescent racemes reaching 2—3 cm. long; rhachis slender, stellately pubescent as are the calyx, corolla and filaments; pedicels short, slender; bract ovate, acute, 2 mm. long, embracing half the base of the calyx-tube. *Calyx*-tube ovoid or urceolate, 3 mm. long, densely grey-tomentose; limb shortly 5-toothed. *Corolla* in bud cylindric above, ventricose at base, puberulous, 15—20 mm. long; when open cleft two-thirds of the way down into 5 equal linear acute lobes which are reflexed at their middle; greenish outside, yellow or orange within. *Stamens* 5, erect, nearly as long as the corolla lobes; anthers linear, obtuse at apex, 2 mm. long; filaments flat, 5 mm. long, sparsely stellate-farinose. *Ovary* ovoid; style rather thick, angled; stigma capitate. *Fruit* ovoid, 8—10 mm. long, contracted and crowned at the top by the persistent calyx-limb, at first farinose at length glabrous; cotyledons pointed. DC. Prodr. IV 305; Bl. Bijdr. 661; Kurz For. Fl. II. 320; Blume Fl. Jav. Loranth. 33, t. 10; Korth. Verh. Lor. 80; Hook. f. Fl. Br. Ind. V. 216; King in Journ. As. Soc. Beng., LVI, ii. 93; Prain Beng. Plants 911; Koord. Exkurs. Fl. Jav. II. 159. *L. farinosus*, Desr. in Lamk. Encyc. III. 597; Roxb. Fl. Ind. ed. Carey & Wall. II. 221; Wall. Cat. 514; Griff. Notul. IV. 616 and Ic. Pl. Asiat. t. 620, f. 1, 2; *L. rigidus*, *contractus* and *Finlaysonianus*, Wall. Cat. 531, 6864, 6871. *L. maculatus* and *venosus* Bl. Bijdr. 662. *Dendrophthoe pentandra* and *farinosa*, Miq. Fl. Ind. Bat.

I. i. 818, 819; van Tiegh. in Bull. Soc. Bot. Fr. XLII, 252. *Scurrula pentandra* G. Don Gen. Syst. III, 424. *Elytranthe farinosa*, G. Don Gen. Syst. VI, 427.

SIAMESE STATES: Setul, *Ridley* 14921!; Trang at 30—60 m. alt., *King's Collector* 1411!. PENANG AND SINGAPORE: *Wallich* 514A!. PENANG: on various trees at 150—300 m. alt., *King's Collector* 1299!; on *Eugenia Jambos*, Penang Hill, *G. King*!; at Penara Bukit, *Curtis* 476!; *Phillips*!. PROVINCE WELLESLEY: *King's Collector* 1613!. PERAK: at Gunong Haram, etc., *Scortechini* 22!, 605!; at Waterfall, Gunong Inas, etc., *Wray* 1267!, 1839!, 1903!, 2062!, 4085!; on tree-branches at Larut, etc., *King's Collector* 4931!, 7538!, 7767!; at Pangkor, *Ridley* 8032!. PAHANG: on *Hibiscus tiliaceus*, Sungei Meang, *Ridley* 1534!. MALACCA: *Maingay* K.D. 685!, 687!; *Cuming* 2363! SINGAPORE: *Lobb* 293!; *Hullett* 345!; *King's Collector* 1164!; *Deschamps*!; at Changi, *Ridley* 1930!; on trees in Bot. Garden, *Ridley* 6817!, 8901!.—DISTRIB. India (E. Bengal), Burma, Siam, Sumatra, Java, Borneo.

15. *LORANTHUS LONGIFLORUS* Desr. in Lamk. Encycl. III 598 (1789). A large parasitic glabrous shrub; branches stout, marked by prominent pale lenticels on a grey smooth bark; branchlets terete, smooth, the nodes swollen. *Leaves* coriaceous, opposite or alternate, very variable in shape; oval, oblong or elliptic, obtuse at apex, attenuate or rounded at base; both surfaces dull, olive brown when dry; 9—15 cm. long, 4—7 cm. broad; midrib very stout at base but quickly narrowing, prominent; main nerves very irregular, about 6—10 pairs, much branched, and joined by irregular transverse nervules; reticulation obscure; petiole stout, 0—1 cm. long. *Racemes* axillary or from the axils of fallen leaves or from 1—2-year old wood, solitary or fascicled, inserted in a shallow cup-like involucre, 4—7 cm. long, many-flowered, usually upcurved with upcurving flowers; pedicels 4 mm. long, slender; bract cupular, acuminate on the upper side and embracing the calyx-tube. *Calyx*-tube short; limb cup-shaped, entire or minutely denticulate. *Corolla* pink or red, often with green lobes; buds 4—4.5 cm. long, curved, gradually enlarging upwards and clavate at tip; when open the tube 3 cm. long, cleft above in 5 lobes which are reflexed for 1—1.5 cm. long, one or two clefts often deeper than the rest. *Stamens* 5; anthers narrow, 12 mm. long, the filaments equal or shorter. *Ovary* sunk in the calyx-tube; style as long as the corolla-lobes; stigma capitate. *Fruit* oblong, smooth or dotted, 1—1.5 cm. long, crowned by the



cupular calyx-limb. DC. Prodr. IV, 304; Roxb. Fl. Ind. Ed. Carey and Wall. II, 217; Wight & Arn. Prodr. iv. 384; Dalz. & Gibs. Bomb. Fl. 110; Brandis For. Fl. 397 and Ind. Trees 549; Kurz For. Fl. II. 321; Wall. Cat. 507; Wight Ic. t. 302; Hook. f. Fl. Br. Ind. V. 214; Trimen Fl. Ceyl. III, 468; Cooke Fl. Bomb. II. 548; Prain Beng. Plants 910. *L. bicolor*, Roxb. Corom. Pl. II. 20 t. 139; Fl. Ind. I. 548, II. 185; Wall. Cat. 499. *L. Wightianus*, Wall. Cat. 6872. *Dendrophthoe longiflorus*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 252. *Scurrula longiflora*, G. Don Gen. Syst. III, 423. 'Valli-ithi-cauni' Rheede Hort. Mal. X. 5, t. 4.

MALACCA: Griffith 1710!.—DISTRIB. India, Burma, Ceylon.

16. LORANTHUS GRANDIFRONS, King in Journ. As. Soc. Beng. LVI. ii, 93 (1887). A parasitic shrub reaching 90—120 cm. in height; branches stout with dark greyish-brown roughly lenticellate bark; branchlets terete, rather slender, little swollen at the nodes; dark-brown. Leaves alternate or sub-opposite or rarely opposite, thickly coriaceous; broadly ovate or lanceolate, acute or acuminate at apex, rounded or cordate at base; both surfaces dull, sparsely pulverulent, upper often bullate, dark brown when dry; margin recurved; 12—27 cm. long, 6—16 cm. broad; midrib very stout, slightly raised above, very prominent beneath; main nerves 4—6 pairs, prominent, especially on the lower surface, the lower pairs from near the base, the others distant, all curving upwards and joined in loops towards the margin; secondary nerves and transverse nervules also prominent beneath; petiole very stout, 1.5—3 cm. long. Flowers in racemes from the axils of the leaves or of fallen leaves; the racemes 6—10 cm. long, densely covered with grey pulverulent sub-deciduous more or less stellate tomentum, erect or curved, about 30-flowered; pedicels short, about 3 mm. long, thick; bract small, ovate, acute, embracing the base of the calyx-tube. Calyx-tube cylindric, inflated at base, 3—5 mm. long; limb 5—6 toothed. Corolla-tube cylindric, slender, base whitish, upper parts pink, 6—8 cm. long, curved, 5-ribbed, more or less inflated above the middle; lobes 5, red within, nearly 2 cm. long, the upper 1 cm. reflexed, linear. Stamens 5, exsert; anthers linear, flattened, obtuse, 5—8 mm. long; filaments flat, 4 mm. long, stellate-pulverulent. Ovary ovoid; style filiform, angular, slightly longer than the stamens; stigma subglobose. Fruit ovoid, thickly grey-pulverulent, crowned by the persistent calyx-limb, 8 mm. long, 6 mm. in diam.

SIAMESE STATES: Pongah and Kasum, *Curtis* 3266!. PERAK: at Hulu Kwansa, *Scortechini* 926!; at Kota and Matang Sambu Wray 1958!, 2517!; on the branches of trees near Kinta river and Larut, *King's Collector* 786!, 2067!. NEGRI SEMBILAN: at Seremban, *Ridley* 10023!. PAHANG: at Tulom Alaty, on *Vitex vestita*, etc., *Ridley* 2248!. SELANGOR: at Kwala Lumpur, *Ridley's Collector*!. MALACCA: at Batang Malaka, *Derry* 1156! Vern. 'Mendalu hesar.'—DISTRIB. Sumatra (*Forbes* 1665!, on trees by the edge of heavy forest in Lampongs).

17. *LORANTHUS SCORTECHINII*, King in Journ. As. Soc. Beng. LVI. ii. 94 (1887). A parasitic shrub reaching 60—90 cm. in height; branches stout with smooth shining reddish-brown bark; branchlets thick, terete, smooth, the uppermost pale and angular. *Leaves* coriaceous, in verticils of about 6; elliptic-oblong or oblong-lanceolate, abruptly caudate-acuminate at apex, attenuate at base; both surfaces dark green when fresh, dark olive brown and dull when dry and then minutely wrinkled; margin recurved; 18—25 cm. long, 6—10 cm. broad; midrib very stout, very prominent on both surfaces and minutely wrinkled; main nerves about 15 pairs, invisible in fresh, obscure in dry, specimens, sub-horizontal; petiole very stout, 2—6 cm. long, narrowly winged by the decurrent margins of the blade. *Flowers* numerous, crowded, in short racemes scarcely 4—6 cm. long, at most, from the old wood; rhachis very stout, woody, pitted; pedicels very short, stout; bract ovate, acute, 2 mm. long, embracing the base of the calyx-tube. *Calyx*-tube cylindric, 5 mm. long, limb irregularly dentate. *Corolla* pale yellow, the lobes tinged with green; tube glabrous, cylindric at base, gradually expanded in a slender curved funnel, 10 cm. long; lobes 6, linear, 3 cm. long, the upper 2 cm. recurved in flower. *Stamens* 6; anthers linear, acute, 8—10 mm. long; filaments slender, as long as anthers. *Ovary* cylindric; style filiform, as long as the stamens; stigma red, globose. *Fruit* not seen. *Kingella Scortechinii*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 250.

PERAK: at Gunong Haram, etc., *Scortechini* 90!, 702!; on branches of large trees near Goping at 90—240 m., *King's Collector* 6020!.

18. *LORANTHUS DUTHIEANUS*, King in Journ. As. Soc. Beng. LVI. ii. 94 (1887). A parasitic shrub; branches stout; branchlets terete, sparsely lenticellate with pale pinkish-brown bark, uppermost



slender, angular when dry, glabrous. *Leaves* coriaceous, alternate, opposite or in verticils of 3 together; elliptic-oblong or elliptic-lanceolate, obtusely acute at apex, attenuate at base; both surfaces glabrous, greyish-green when dry, 5—8 cm. long, 2—3 cm. broad; midrib slender, raised on both surfaces; main nerves invisible in fresh, rather prominent in dry, specimens, 3—5 pairs, irregular, very oblique, curving to anastomose near the margin in an areolate reticulation; petiole 1 cm. long, rather stout. *Flowers* in slender racemes from the axils of the leaves or of fallen leaves, reaching 1—5 cm. in length and about 6-flowered; rachis, pedicels and bracts minutely puberulous; pedicels 3—4 mm. long; outer bract small, ovate, acute, embracing a pair of flowers each of which is supported by a shallow cup-shaped bracteole. *Calyx*-tube cylindric, 3—4 mm. long; the limb short, truncate, waved at the margin. *Corolla* tubular, glabrous, bright red, curved, inflated upwards and constricted at the neck in bud, 4—5 cm. long; lobes 6, linear, subspathulate, 8—10 mm. long, eventually reflexed. *Stamens* 6; anthers oblong, 2 mm. long, filaments about 4 mm. long, slender. *Ovary* cylindric, surmounted by a thickened cushion from which springs the filiform style, as long as the stamens; stigma globose. *Fruit* not seen. *Arculus Duthieanus*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 445.

PERAK: *Scortechini*!. SINGAPORE: at Bukit Timah, *Ridley*!.

van Tieghem makes this a separate genus nearer to *Elytranthe* than to *Loranthus*. I do not find the two bracteoles to each flower that he discovered, but there certainly is one. I prefer to retain *Arculus* in *Loranthus*, but it certainly is different from the rest of the genus.

## 2. LOXANTHERA, Blume.

Parasitic shrubs. *Leaves* coriaceous, entire, exstipulate, opposite or alternate. *Flowers* in short cymes from the axils of the leaves or of fallen leaves; bract ovate, very small, embracing the base of the calyx-tube. *Calyx*-tube cylindric; limb cupular, irregularly cleft. *Corolla*-tube very long, contracted a little above the base and again above the insertion of the filaments; lobes 6, linear-spathulate, reflexed in flower. *Stamens* 6; filaments slender, arched at the top and broadening into the back of the connective rather below its middle; anthers linear, cells 2, parallel. *Ovary* cylindric; style filiform; stigma clavate. *Fruit* of *Loranthus*, etc.—DISTRIB. Two species, in the Malay Peninsula and Archipelago.

1. *LOXANTHERA SPECIOSA*, Blume & Fisch. Fl. Jav. Lor. 11. tt. 20 and 23 C (1828?) A parasitic shrub; branchlets terete, smooth, moderately stout, uppermost sub-compressed. *Leaves* opposite or sub-opposite, coriaceous; ovate or elliptic-ovate, acute or obtuse, sometimes retuse, at apex, attenuate, more or less unequally, at base; both surfaces smooth, glabrous, olive-brown when dry; 8—12 cm. long, 4—6 cm. broad; midrib fairly prominent, dark; main nerves 6—8 pairs, very obscure as is the reticulation; petiole stout, 1—1.5 cm. long. *Flowers* in axillary or sub-terminal, few-flowered, puberulous cymes 2—3 cm. long, the joints very fragile; pedicels stout, 5—8 mm. long; bract very small, ovate, embracing half the base of the calyx-tube. *Calyx*-tube cylindric, 4 mm. long, limb expanded in a cupula 2 mm. long, dentate on the margin. *Corolla*-tube red without, yellow within, curved, in bud 10—12 cm. long, narrowly funnel-shaped to the insertion of the stamens and then constricted, clavate at apex, when open divided into 6 lobes narrowed at the base, spatulate above and circinately twisted, about 4 cm. long. *Stamens* 6; filaments 3 cm. long, curved and thickened at apex in a right angle; anthers attached a little below the middle, hooked at top and bottom, 7 mm. long. *Ovary* cylindric; style filiform; stigma red, clavate. *Fruit* not seen. G. Don Gen. Syst. III. 430; Miq. Fl. Ind. Bat. I. i. 822; van Tiegh. Bull. Soc. Bot. Fr. XLII. 448; Koord. Exkurs. Fl. Jav. II. 166. *Loranthus Loxantherus*, DC. Prodr. IV. 316. *L. coccineus*, Reinw. MS. (not of Jack); Bl. Bijdr. 664. *L. Reinwardtianus*, Schult. Syst. VII. 105; DC. Prodr. iv. 306. *L. speciosus*, King in Journ. As. Soc. Beng. LVI. ii. 95. *non* Bl.

PERAK: *Scortechini* 1328!; on a tree on the banks of the Kinta river, *King's Collector* 767!. MALACCA: *Griffith* K.D. 2716!. JOHORE: Muar river bank, *Curtis* 3661!.—DISTRIB. Java, Sumatra (*Forbes* 3234!), Borneo (near Kuching, *Haviland*!)

### 3. *ELYTRANTHE*, Blume (amplified).

Parasitic shrubs. *Leaves* opposite or subopposite, more or less coriaceous, entire, exstipulate. *Flowers* few, in spikes, racemes or pairs with one bract and two bracteoles which may be free or combined in a cup. *Calyx*-tube cylindric, the limb small, truncate. *Corolla*-tube usually entire, more or less cylindric or funnel-shaped, lobes 5 or 6, usually 6, equal, reflexed in flower. *Stamens* 5—6, anthers basifixed. *Ovary* enclosed in the calyx-tube, style slender, stigma

usually capitate. *Fruit* as in *Loranthus*.—DISTRIB. India, Malaya, Polynesia and New Zealand.

Flowers in spikes; bract and 2 free bracteoles large, longer than the calyx-tube (Sect. I. *EUELYTRANTHE*).

All parts glabrous; leaves ovate or oblong, obtuse; bract and bracteoles obtuse, 6—7 mm. long; corolla-tube white .. .. .

1. *E. albida*.

Most parts scurfily rusty-puberulous; leaves elliptic or obovate, obtuse; bract obtuse, 10—12 mm. long, bracteoles acute, 9—10 mm. long .. .. .

2. *E. Maingayi*.

Flowers in racemes; bract and bracteoles shorter than the calyx-tube, the latter free or combined in a cup (Sect II. *MACROSOLEN*).

Corolla-tube more than 4 cm. long

Leaves more or less ovate, acuminate at apex—

Leaves under 16 cm. long, 6 cm. broad; corolla-tube 4—6 cm. long, crimson, the lobes green with purple tips .. .. .

3. *E. formosa*.

Leaves over 15 cm. long, 6 cm. broad; corolla-tube 5—6 cm. long, bright yellow, the lobes green outside, red within .. .. .

4. *E. Kunstleri*.

Leaves more or less orbicular, cordate at base; corolla-tube 8—9 cm. long, red .. .. .

5. *E. platyphylla*.

Corolla-tube 2—3 cm. long, red; leaves lanceolate, 7—10 cm. long, under 5 cm. broad .. .. .

6. *E. avenis*.

Corolla-tube under 2 cm. long

Calyx-tube and corolla-lobes prominently papillose without; racemes of 2 flowers; leaves oblanceolate

7. *E. papillosa*.

Calyx-tube and corolla-lobes not papillose; racemes rather slender with more than 2 flowers, the flowers clavate in bud, more or less funnel-shaped in flower.

Leaves obovate, usually retuse at apex .. .. .

8. *E. retusa*.

Leaves ovate or lanceolate, usually acute at apex.

Pedicels, bract and bracteoles puberulous; ovary cylindric .. .. .

9. *E. Lowii*.

Pedicels, bract and bracteoles glabrous; ovary globose .. .. .

10. *E. globosa*.

Corolla-tube under 1 cm. long.

Leaves lanceolate or oblong lanceolate, over 2.5 cm. broad, obtusely acuminate; racemes clustered, 4—5-flowered, 12—15 mm. long .. .. .

11. *E. Barnesii*.

Leaves lanceolate, under 2.5 cm. broad, acuminate; racemes in nearly sessile fascicles, 1—3-flowered, scarcely 5 mm. long .. .. .

12. *E. Robinsonii*.

Flowers in pairs in the excavations of a thick peduncle; bract moderately large, bracteoles combined in a trun-

cate cup cleft opposite the bract, shorter than the calyx-tube (Sect. III. *BLUMELLA*).

Bract 2 mm. long, bracteole cup 2—3 mm. long; leaves thinly coriaceous, lanceolate, acuminate at apex, rounded or shortly attenuate at base; corolla-tube deep red, lobes green with purple margins .. 13. *E. diantha*.

Bract 3—4 mm. long, bracteole-cup about 3 mm. long; leaves thickly coriaceous, oblong-lanceolate, obtusely acuminate at apex, attenuate at base: corolla-tube red passing into green, lobes yellow bordered with red .. .. 14. *E. Wrayi*.

1. *ELYTRANTHE ALBIDA*, Blume Fl. Jav. t. 22 (1828?); a large parasitic glabrous shrub; branches stout with pale grey bark and prominent nodes; branchlets thick, terete. *Leaves* opposite, chartaceous or subcoriaceous; ovate or oblong, obtuse or obtusely acute at apex, broadly cuneate or attenuate, often unequally, at base; both surfaces dull bluish-green when fresh, greyish brown when dry; 6—12 cm. long, 3—7 cm. broad; midrib moderately stout, prominent on the lower surface, less so on the upper; main nerves 10—12 pairs, irregular, spreading, early-branched, joined by the slender secondary nerves and irregularly areolate reticulation, prominent especially on the lower surface; petiole rather slender, 1—2 cm. long. *Flowers* in 2—6-flowered distichous spikes, single or clustered in the axils of the leaves or of fallen leaves; peduncles stout, about 1 cm. long or longer; rhachis stout, decussately excavated to receive the flowers, usually about 1 cm. long or less; bract boat-shaped, concave, keeled, obtuse, 6—7 mm. long; bracteoles 2, thinner, as long as the bract and produced beyond it. *Calyx*-tube cupular, short, truncate. *Corolla* tube white, constricted above the ovary, then enlarged, curved, 2—3 cm. long; lobes 5—6, slender, bluish without, pale pink within, recurved in flower, 1 cm. long, thickened in a band in the middle within, the tip acute. *Stamens* 5—6; anthers 1—2 mm. long, oblong, apiculate; filaments broad, crimson, 5 mm. long. *Ovary* ovoid, style rather thick; stigma small, capitate. *Fruit* not known. G. Don Gen. Hist. III. 428; Miq. Fl. Ind. Bat. I. i. 832; Engl. & Prantl Naturl. Pflanzenfam. III. i. 189; van Tiegh. Bull. Soc. Bot. Fr. XLII. 439; Koord. Exkurs. Fl. Jav. II. 163. *Loranthus albidus*, Blume Bijdr. 665; DC. Prodr. IV. 299; Korth. Verhand. Loranth. 87; Hook f. Fl. Br. Ind. V. 222; King in Journ. As. Soc. Beng. LVI. ii. 98; Brandis Ind. Trees 551. *L. leucosiphon*, Griff. Notul. IV. 623 and Ic. Pl. Asiat. tt. 619, 621—623.

SIAMESE STATES: Trang, *King's Collector* 1422!. PENANG:

Government Hill, *Curtis* 1113!. PERAK: at Gunong Haram, *Scortechini* 428!, 626!; at lower camp, Gunong Batu Pateh, about 1000 m. alt., *Wray* 450!. MALACCA: *Griffith* K.D. 2708!; *Maingay* K.D. 693. SINGAPORE: at Bukit Timah, *Ridley* 8042!.—DISTRIB. Java, Sumatra, Borneo.

2. *ELYTRANTHE MAINGAYI*, Gamble. A parasitic shrub; branchlets terete, moderately stout, scurfily rusty-puberulous, uppermost somewhat flattened; nodes distant, thickened. *Leaves* opposite, coriaceous; elliptic or obovate, obtuse at apex, acute at base; both surfaces dull, rusty-brown when dry, scurfy; 5–8 cm. long, 2–5 cm. broad; midrib moderately stout, nearly black on the lower surface; main nerves slender, obscure, 3–6 pairs; reticulation not visible; petiole stout, 6–12 mm. long, rusty-puberulous. *Flowers* in sessile, axillary, scurfily rusty-pubescent spikes, single or fascicled, about 1–1.5 cm. long; rhachis very stout, decussately excavated to receive the flowers; bract oblong, obtuse, scurfily pubescent, 10–12 mm. long; bracteoles 2, oblong acute, also scurfily pubescent, 9–10 mm. long. *Calyx*-tube rather slender, limb cupular, 2–2.5 mm. long, glabrous. *Corolla*-tube glabrous, at first broad, then constricted, then funnel-shaped, 4 mm. long; lobes 6, linear, acuminate, spreading or recurved, 10 mm. long, thickened within. *Stamens* 6; anthers acuminate, 1–1.5 mm. long; filaments broad, 2–3 mm. long. *Ovary* ovoid; style rather stout; stigma capitate. *Fruit* not known. *Loranthus Maingayi*, Hook f. Fl. Br. Ind. V. 222.

MALACCA; *Maingay* K.D. 694!. SINGAPORE: at Karanji, *Ridley* 6923!.

3. *ELYTRANTHE FORMOSA*, G. Don Gen. Hist. Dichl. Pl. III. 426 (1834). A parasitic shrub reaching 1.5–2 m. in height, all parts glabrous; branches rounded, pale brown, smooth; branchlets terete, brown, uppermost obscurely angled; nodes swollen. *Leaves* opposite or slightly sub-opposite, coriaceous; ovate or elliptic-ovate or -lanceolate, acuminate and often cuspidate at apex, obtuse rounded or rarely attenuate at base; upper surface shining, somewhat bullate, lower smooth; margins recurved; 10–16 cm. long, 4–6 cm. broad; midrib stout, prominent; main nerves 6–8 pairs, irregular, often obscure, if visible impressed above, somewhat prominent beneath, curving upwards to and along the margin: secondary nerves and reticulation obscure; petiole stout, channelled, about 3–5 mm. long. *Flowers* in few- (3-5) flowered umbellate cymes from the

axils of the leaves or of fallen leaves; peduncle stout, about 3 mm. long; pedicels 3—4 mm. long; bract ovate, concave, 1—5 mm. long; bracteoles 2, smaller, obtuse or slightly acute. *Calyx*-tube cylindric, the limb obscurely toothed, slightly spreading. *Corolla* tube bright crimson, 4—6 cm. long, curved, gradually inflated above and again constricted at the mouth below the lobes; lobes in bud 6, greenish, the tips purple, obovate, afterwards reflexed and twisted, 1—2 cm. long, thickened in a broad ridge inside. *Stamens* 6; filaments broad, 1 cm. long; anthers linear-oblong, 4 mm. long, minutely apiculate. *Ovary* cylindric; style filiform, geniculate near the top; stigma obtuse. *Fruit* not seen. Engl. & Prantl *Naturl. Pflanzenfam.* Nachtr. 126; Koord. Exkurs. Fl. Jav. II. 164. *Loranthus formosus*, Bl. Bijdr. 664 and Fl. Jav. Loranth. t. 15; DC. Prodr. IV. 297; Kurz For. Fl. II. 317; Hook. f. Fl. Br. Ind. V. 220; King in Journ. As. Soc. Beng. LVI. ii. 95 *Macrosolen formosus*, Miq. Fl. Ind. Bat. I. i. 827; van Tiegh. in Bull. Soc. Bot. Fr. XLI 442.

PERAK: *Scortechini* 392!; at Gunong Batu Putih, lower camp and summit, 1800 m. alt., *Wray* 484!, 873!; on trees at 1000—1200 m. alt., *King's Collector* 2170!, 6264!; at Bujong Malacca, 700—800 m. alt., *Curtis* 3322!.—DISTRIB. Burma (*Griffith* K.D. 2729); Java.

The description has been largely taken from that of *Scortechini*.

4. *ELYTRANTHE KUNSTLERI*, Gamble. A large parasitic shrub, usually up to 1 m. in height, sometimes reaching 3 metres, all parts glabrous; branches stout, swollen at the nodes, the bark pale brown; branchlets stout, terete, pale. *Leaves* coriaceous, opposite; ovate to ovate-oblong, acuminate at apex, rounded at base; both surfaces shining, somewhat bullate and olive-brown when dry; margins recurved; 15—25 cm. long, 6—12 cm. broad; midrib very stout, prominent on both surfaces; main nerves 6—10 pairs, prominent, impressed above, raised beneath, irregular, curving to disappear a little short of the margin; secondary nerves also prominent, but much shorter, reticulation obscure; petiole 0 or stout and scarcely 3 mm. long. *Flowers* in few- (about 5-) flowered cymes 1—1.5 cm. long, single or clustered in the axils of the leaves or of fallen leaves; peduncle stout, about 5 mm. long; pedicels 5—7 mm. long; bract ovate, acute, 2—3 mm. long; bracteoles smaller, obtuse, all concave. *Calyx*-tube cylindric, smooth, 6 mm. long, the limb truncate, wavy, slightly spreading. *Corolla* clavate and boldly 6-angled in bud;



tube bright yellow, slightly curved, inflated at the base of the limb, 5—6 cm. long; lobes 6, bright green externally, dark red within, reflexed, sub-spathulate, 1.5—2.5 cm. long, broadened below, with a broad thick ridge internally, the tips acute. *Stamens* 6; filaments stout; anthers linear, 7—8 mm. long, obtuse at apex. *Ovary* cylindric; style slender; stigma truncate. *Fruit* ovoid, 14 mm. long, 8 mm. broad, bright yellow when fresh, black when ripe; seed ovoid, 1 cm. long, sulcate. *Loranthus Kunstleri*, King in Journ. As. Soc. Beng. LVI. ii. 95 (1887). *Macrosolen Kunstleri*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 442.

PERAK: on trees from sea level up to 250 m. alt. near Larut, Goping and Thaiping, *King's Collector* 2669!, 2760!, 6009!, 8460!. DINDINGS: at Telok Sera, *Ridley* 8030!. PAHANG: Taban river and Kadonding Pulau, *Ridley*!.—DISTRIB. Borneo? (*Haviland*).

5. ELYTRANTHE PLATYPHYLLA, Gamble. A glabrous parasitic shrub; branchlets stout, pale brown, quadrangular. *Leaves* coriaceous, opposite or subopposite; broadly ovate-rotund or suborbicular, obtusely rounded at apex, cordate at base; both surfaces smooth, olive green when dry; margins unequally and remotely crenate or entire; 9—12 cm. long and broad; midrib prominent, thick at base but quickly narrowing; main nerves 4—6 pairs, chiefly from near the base, spreading to anastomose near the margin; reticulation irregularly areolate; petiole very stout, scarcely 2 mm. long. *Flowers* in very short axillary racemes of about 4; bract ovate, acute; bracteoles joined in a hemispheric minutely margined cup. *Calyx*-tube cylindric, truncate, the limb scarcely lobed. *Corolla* large, curved, tubular, red, expanding slightly upwards, 6-angled and inflated below the apex, the tube 8—9 cm. long; lobes 6, green, 2 cm. long, reflexed, linear-lanceolate or subspathulate, blunt and inflexed at the tips, broadly thick-ridged within, spreading at base. *Stamens* 6; anthers linear, with a minute spur at base, 7 mm. long; filaments thick, 10 mm. long. *Ovary* cylindric; style filiform; stigma small, subcapitate. *Fruit* not known. *Loranthus platyphyllus*, King in Journ. As. Soc. Beng. LVI. ii. 97 (1887) *not* of Rich.

PERAK: Scortechini 606?!. SELANGOR: at Ginting Bidai, *Ridley* 7618!. JOHORE: at Sungei Hulu Sembrong, *Lake and Kelsall*!

6. ELYTRANTHE AVENIS, G. Don Gen. Syst. Dichl. Pl. III. 426 (1834). A parasitic shrub reaching 1.5 m. in height, glabrous; branchlets angular, moderately stout, with rough scaly reddish-

brown bark; nodes swollen, uppermost internodes compressed. *Leaves* coriaceous, opposite or subopposite: lanceolate, obtusely acute or acuminate at apex, attenuate at base; both surfaces dull, olive green when dry, margins slightly recurved; 7—10 cm. long, 2.5—5 cm. broad; midrib fairly stout, raised on both surfaces; main nerves obscure, if visible when dry 6—10 pairs; reticulation obscure; petiole none or very short, bordered by the decurrent margins of the blade. *Flowers* in short 3-flowered cymes, single or 2—3 or more together in the axils of the leaves or of fallen leaves; peduncle very short, about 1 mm. long; pedicels slender, 4 mm. long; bract ovate, acute, 2 mm. long; bracteoles shorter, rounded, the bract and bracteoles together embracing the calyx-tube. *Calyx*-tube cylindric, 2 mm. long, the limb irregularly 5—6-lobed. *Corolla* tube slender, curved, red, slightly thickened below the limb, 2—3 cm. long; lobes 6, linear, reflexed in flower, thickened, 1.5—2 cm. long. *Stamens* 6; anthers narrowly linear with a slight spur at the base, 4 mm. long; filaments filiform, 8 mm. long. *Ovary* cylindric; style filiform; stigma globose. *Fruit* (immature) ovoid. *E. evenia*, Engl. in Engl. & Prantl Nachtr. 126; Koord. Exkurs. Fl. Jav. II. 164. *Loranthus avenis*, Bl. Bijdr. 663 (1825); DC. Prodr. IV. 297; Korth. Verh. Lor. 85. *L. evenius*, Bl. Fl. Jav. Loranth. t. 16, (1828?); King in Journ. As. Soc. Beng. LVI. ii. 97. *Macrosolen evenius*, Miq. Fl. Ind. Bat. I. i, 827. *Miquelina evenia*, van Tiegh. Bull. Soc. Bot. Fr. XLII. 443.

KEDAH: on Kedah Peak, Ridley 5485!. PERAK: *Scortechini*!; on Gunong Hijan, Gunong Bubu and Ulu Batang Padang, at about 1500 m. alt., Wray 645!, 1503!, 3884!. PAHANG: at Kluang Terbang, Barnes 10906?!.—DISTRIB. Java, Sumatra (Mt. Dempo, Forbes 2401!)

Wray, on No. 3884, says the flowers are 'very pale green', but Miquel describes them as red as does Koorders, while the plate in Blume's Flora Javae shows them as pale dull red. In every other respect Wray's specimens agree perfectly. I am rather doubtful about Barnes 10906 which has thinner and more acute leaves.

*Loranthus hypoglauca*, Kurz in Journ. As. Soc. Beng. II. 309 (1872) and For. Fl. II. 318; Hook f. Fl. Br. Ind. V. 50 may possibly be only a variety of this with leaves glaucous beneath and corolla tube a little more uniform in thickness (Pegu: Nattoung ridge, 6000 ft. Kurz 382!)

7. *ELYTRANTHE PAPILLOSA*, Gamble in Kew Bull. 45 (1913). A parasitic shrub; branchlets rather slender, round, rough, pale brown. *Leaves* opposite, coriaceous; oblanceolate, rounded at apex, cuneate at base; both surfaces dull when dry and olive brown; 3—4 cm.

long, about 1—5 cm. broad; midrib slender, obscure; main nerves 1—2 pairs, from close to the base only and very oblique, scarcely visible on the lower surface; reticulation not apparent; petiole none or at least under 3 mm. long. *Flowers* yellow-orange, in very short pedunculate pairs, 1—2 together in the axils of the leaves or of fallen leaves; peduncle about 1 mm. long as are the pedicels; bract small, ovate, acute; bracteoles minute, in a 2-lobed lip. *Calyx*-tube ovoid, 2 mm. long, prominently papillose, the limb a mere rim. *Corolla*-tube glabrous, cylindric in bud and 6-angled, funnel-shaped in flower, 7—8 mm. long; lobes 6, prominently papillose without, spathulate and recurved in flower, 5—6 mm. long. *Stamens* 6; anthers oblong, 1—5 mm. long; filaments slender, 5 mm. long. *Ovary* ovoid; style slender; stigma capitate. *Fruit* not known.

SINGAPORE: at Kranji, Ridley 2045!

8. *ELYTRANTHE RETUSA*, G. Don Gen. Syst. Dichl. Pl. III. 425 (1834). A parasitic glabrous shrub; branchlets stout, rough, lenticellate, greyish-brown; nodes swollen. *Leaves* opposite or subopposite, thickly coriaceous; obovate, elliptic or orbicular, sometimes obcordate, obtuse or retuse at apex, cuneate or attenuate at base; upper surface somewhat shining, olive-brown when dry, lower dull; margins recurved; 5—12 cm. long, 2.5—5 cm. broad; midrib rather stout, raised on both surfaces; main nerves 3—5 pairs, obscure and sometimes invisible; reticulation obscure; petiole very stout, 5—7 mm. long. *Flowers* in racemes of 5—7 up to about 1—5 cm. long, solitary or in pairs from the axils of the leaves or of fallen leaves; pedicels slender, 2—3 mm. long; bract ovate, acute, very small; bracteoles combined in a 2-toothed cup, minute. *Calyx*-tube cylindric, 2—3 mm. long, the limb a narrow entire rim. *Corolla*-tube pale rose, cylindric below, dilated below the lobes, up to 2 cm. long; lobes 5—6 usually 6, linear, reflexed in flower, 1 cm. long, yellowish-green. *Stamens* 5—6; anthers linear, slender, 3—4 mm. long; filaments broad, 5 mm. long. *Ovary* included in the calyx-tube; style slender; stigma capitate. *Fruit* globose ovoid, 5—7 mm. long. Engl. & Prantl Naturl. Pflanzenfam. III. i. 188; Koord. Exkurs. Fl. Jav. II. 164. *Loranthus retusus*, Jack in Roxb. Fl. Ind. ed. Carey and Wall. II 212; DC. Prodr. IV. 296; Wall. Cat. 504 in part; Hook. f. Fl. Br. Ind. V. 219. *Macrosolen retusus*, Miq. Fl. Ind. Bat. I. i. 828; van Tiegh. in Bull. Bot. Soc. Fr. XLII. 442.

PERAK: at Lumut on *Eugenia*, Ridley 9432!. MALACCA: Griffith K. D. 2703!; Maingay K. D. 688!; Cuming 2305!; on *Dacrydium*,

Mount Ophir, *Ridley* 3160!; top of Mount Ophir, *Hullett*!. SINGAPORE: *Wallich* 504!; on *Rhodomyrtus* at Changi, *Ridley* 1808!; *King's Collector* 1170!.—DISTRIB: Java, Borneo.

9. *ELYTRANTHE LOWII*, Gamble. A parasitic shrub; branchlets moderately stout, terete, brown, the nodes slightly swollen. *Leaves* rigid, coriaceous, opposite; ovate or lanceolate, acute or acuminate at apex, attenuately rounded at base; upper surface shining, olive-green when dry, lower dull, subglaucous; margins recurved when dry; 4—6 cm. long, 1.5—2.5 cm. broad; midrib slender, visible only on the undersurface; main nerves about 4—6 pairs, rarely at all visible; reticulation invisible; petiole stout, rugose, 3—4 mm. long. *Flowers* in 2—4-flowered racemes, scarcely 1 cm. long, in axillary clusters of 1—3; pedicels puberulous, about 3 mm. long; bract ovate, acute, 2—3 mm. long; bracteoles united in a 2-toothed cup, 1—2 mm. long, both puberulous without. *Calyx*-tube cylindric, smooth, 4 mm. long; the limb very short, truncate, waved. *Corolla*-tube curved, 6-angled and slightly inflated at the base of the lobes, 1—1.5 cm. long; lobes 6, 1 cm. long, subspathulate, thickened at the apex, reflexed in flower. *Stamens* 6; anthers oblong, 1—5 mm. long; filaments broad, 6 mm. long. *Ovary* cylindric; style filiform, nearly as long as the stamens; stigma capitate. *Fruit* not known. *Loranthus Lowii*, King in Journ. As. Soc. Beng. LVI. ii. 98 (1887).

PERAK: without locality, *Scortechini* 861!.

10. *ELYTRANTHE GLOBOSA*, G. Don Gen. Syst. Dichl. Pl. III. 426 (1834). A parasitic usually glabrous shrub; branchlets terete, pale brown with lenticellate bark, the nodes swollen. *Leaves* coriaceous, opposite or rarely alternate or in whorls of three; elliptic-ovate or lanceolate, sometimes more or less oblong, acuminate at apex, attenuate at base; both surfaces smooth, shining, olive brown when dry; 6—12 cm. long, 2—6 cm. broad; midrib conspicuous, impressed above; main nerves irregular, often obscure, 5—6 pairs; reticulation obscure; petiole 3—8 mm. long. *Flowers* in axillary racemes, single or in pairs or sometimes clustered, up to 2—3 cm. long; pedicels slender, 0—3 mm. long; bract ovate, acute, 2 mm. long, bracteole-cup 1 mm. *Calyx*-tube urceolate, smooth; limb cup-shaped, truncate. *Corolla* in bud linear-clavate, with folds below the lobes, when open campanulate and slightly gibbous, obtuse, 5—6 mm. long; lobes 6 or sometimes 5, linear, reflexed at the middle, glabrous without, colour varying from green to yellow, usually with purplish tips and

stripes. *Stamens* as many as the corolla-lobes; filaments slender, exsert; anthers small, the cells parallel. *Ovary* conform to the calyx-tube; style long, filiform; stigma large, capitate. *Fruit* an ovoid or globose berry, smooth or minutely dotted, reaching 5 mm. in diam., yellowish in colour, the pericarp fleshy. Engl. & Prant. Naturl. Pflanzenfam. III. i. 188; Koord. Exkurs. Fl. Jav. II. 164. *E. ampullacea*, G. Don l.c. 425. *Loranthus globosus*, Roxb. Fl. Ind. I. 550, II. 187 and ed. Carey and Wall. II. 206; DC. Prodr. IV. 297; Wall. Cat. 6870; Kurz For. Fl. II. 315; Hook. f. Fl. Br. Ind. V. 220. *L. subglobosus*, Wall. Cat. 538; DC. l.c. 297; Kurz l.c. 316. *L. oleoides*, DC. l.c. *L. oleifolius*, Wall. Cat. 524. *L. viridiflorus*, Wall. in Roxb. Fl. Ind. ed. Carey and Wall. II. 219; Wall. Cat. 512. *L. sphaerocarpus*, Bl. Bijdr. 661 and Fl. Jav. Loranth. t. 17; DC. l.c. 297; Korth. Verh. Lor. 85. *L. ampullaceus*, Roxb. l.c. 189 and 209; DC. l.c. 296; Kurz l.c. 316; Wall. Cat. 502; King in Journ. As. Soc. Beng. LVI. II. 97. *L. pallens* and *L. carinatus* Wall. Cat. 523, 529; DC. l.c. 296, 297. *L. subumbellatus*, Bl. Bijdr. 661 and Fl. Jav. Loranth. t. 17; DC. l.c. 297. *Macrosolen pallens*, *sphaerocarpus* and *oleoides*, Miq. Fl. Ind. Bat. I. i. 830, 831.

SIAMESE STATES: Trang, *King's Collector* 1398!. KEDAH: Pulau Lankawi, *Curtis* 2421!. PENANG: *Wallich* 523!, 524!; *King's Collector* 1663!. PERAK: at Tapa, *Wray* 1419!; *King's Collector* 7866!, 10697!; *Scortechini* 221!, 859!. MALACCA: *Griffith* K.D. 2704!; *Cuming* 2343!; *Maingay* K.D. 689!. SINGAPORE: *Murton* 13!; *King's Collector* 1142!; *Ridley* 403!, 2022! etc.; *Hullett* 655!.

Var. *puberula*, Gamble. Inflorescence covered with grey puberulous down; fruits rugose.

PERAK: at Kuala Kangsa, *Wray* 3355!; at Ulu Bubong, *King's Collector* 10088!; *Scortechini* 258!. TRINGGANU: at Pulau Kaltan, *Ridley*!. SINGAPORE: *Ridley* 9220!, 14173!.

11. ELYTRANTHE BARNESII, Gamble in Kew Bull. 45 (1913). A parasitic glabrous shrub (?); branchlets stout with brown rough bark, the nodes much swollen. *Leaves* coriaceous, opposite; lanceolate or oblong-lanceolate, obtusely acuminate at apex, rounded, usually unequally, at base; margins recurved; upper surface shining, lower dull, olivaceous when dry; 6—12 cm. long, 2.5—4.5 cm. broad; midrib prominent and raised on both surfaces; main nerves 7—9 pairs, nearly at right angles to the midrib, curved near the margin, reticulation not visible; petiole stout, 5—7 mm. long. *Flowers* in 4—5-flowered glabrous racemes about 12—15 mm. long, clustered

many together on the enlargement of the nodes in the axils of the leaves and at the ends of the branchlets; pedicels slender, 1.5—2 mm. long; bract ovate-acute, the bracteoles similar and nearly free. *Calyx*-tube ovoid, vertically channelled; limb 1 mm. long, truncate. *Corolla* in bud clavate, angled below the lobes, 8 mm. long; when open the 6 lobes linear acute, reflexed from about the middle (?). *Stamens* 6; anthers oblong, 1.25 mm. long; filaments 3.5 mm. long. *Ovary* ovoid; style slender, slightly angled; stigma obtuse or emarginate. *Fruit* not known.

PAHANG: at Kluang Terbang, W.D. Barnes 10905!

12. *ELYTRANTHE ROBINSONII*, Gamble in Kew Bull. 45 (1913). A parasitic shrub growing on trees; branches stiff, with greyish-brown thin bark; branchlets slender, wiry, the uppermost somewhat angular when dry; all parts glabrous. *Leaves* coriaceous, opposite or sub-opposite; narrowly lanceolate, acuminate at apex and at base; upper surface red, lower dull green when fresh, upper olivaceous, shining, lower ferruginous-brown and dull when dry; 5—8 cm. long, 1—2.5 cm. broad; midrib slender, prominent on both surfaces; main nerves indistinct, 3—5 pairs, irregular, very oblique and speedily disappearing; reticulation obscure; petiole 3—4 mm. long, bordered by the decurrent margins of the blade. *Flowers* small, bright orange red, in nearly sessile fascicles of 1—3-flowered racemes scarcely 5 mm. long in the axils of the leaves or of the scars of fallen leaves; pedicels very short; bract ovate, acute; bracteoles combined in a bifid lip. *Calyx*-tube ovoid, 2 mm. long, the limb truncate, entire or very slightly lobed. *Corolla* in bud clavate, 5—6 mm. long, angled below the lobes; lobes 6, linear-lanceolate, as long as the tube. *Stamens* 6: anthers very small, 0.5 mm. long, the filaments 1.5 mm. long. *Ovary* ovoid; style slender; stigma small, obtuse. *Fruit* not known. *Loranthus globosus*, Ridley in Journ. Linn. Soc. XXXVIII. 321 not of Roxb.

PAHANG: on Gunong Tahan, 1200—1500 m. alt., Wray and Robinson 5404!

13. *ELYTRANTHE DIANTHA*, Gamble. A parasitic shrub, reaching 1 m. in height, quite glabrous; branchlets slender, terete, with pale brown bark, the nodes swollen. *Leaves* opposite, thinly coriaceous; lanceolate or rarely ovate-lanceolate, long acuminate at apex, rounded or very shortly attenuate at base; both surfaces olive-green and somewhat shining when dry; margins slightly recurved;



8—15 cm. long, 2—6 cm. broad; midrib slender, raised on both surfaces; main nerves 4—6 pairs, irregular, oblique, slightly raised above; reticulation also slightly raised when dry, areolate; petiole rather slender, 4—6 mm. long. *Flowers* in pairs in the excavations of a very short peduncle, each with an ovate-acute bract 2 mm. long at the base; bracteoles united in a thick cup 2—3 mm. long, cleft at the outer margin opposite the bract and embracing the base of the calyx-tube. *Calyx*-tube smooth, cylindric, the limb short, truncate. *Corolla* deep red, curved, narrowly tubular, inflated and boldly 6-angled just under the limb, clavate in bud, 5 cm. long; lobes 6, twisted, reflexed, oblanceolate, 2 cm. long, thickened within in a flattened ridge, green with purple margins. *Stamens* 6, lemon-yellow: anthers linear, 5—6 mm. long; filaments 7 mm. long, green. *Ovary* cylindric; style filiform; stigma capitate. *Fruit* globular, smooth, 10—12 mm. in diam., crowned by the calyx-limb. *Loranthus dianthus*, King and Scort. M.S.; King in Journ. As. Soc. Beng. LVI. ii. 96 (1887). *Blumella diantha*, van Tiegh. in Bull. Soc. Bot. Fr. XLII. 441.

PERAK: near Larut, *Scortechini* 76!, 604!; at Relan Tujor, *Wray* 1785!, 2210!; on trees in open forest up to 250 m. alt., *King's Collector* 1870!, 6446!.

14. ELYTRANTHE WRAYI, Gamble in Kew Bull. 46 (1913). A parasitic shrub; branchlets stout, terete, with pale brown bark, the nodes swollen. *Leaves* opposite, thickly coriaceous; oblong-lanceolate, obtuse or obtusely acute, sometimes obtusely acuminate at apex, attenuate and often unequal at base; both surfaces green tinged with red when fresh, smooth and olive-green when dry; 10—13 cm. long, 3—7 cm. broad; midrib stout, raised on both surfaces; main nerves 5—6, irregular, oblique, joined by a faint often obscure reticulation; petiole 0—10 mm. long, bordered by the decurrent margins of the blade. *Flowers* in pairs in the excavations of a short thick axillary peduncle, each flower subtended by a broadly ovate horizontal bract 3.5 mm. long; bracteoles united in a thick truncate cup 3 mm. long, cleft at the outer margin opposite the bract and embracing the calyx-tube; peduncle 3 mm. long, thick. *Calyx*-tube smooth, cylindric, 3—4 mm. long, the limb also cylindric, truncate, 4—6 mm. long. *Corolla*-tube red passing into green below the lobes, curved, narrowly tubular, inflected below the lobes and 6-angled, clavate in bud, 4—5 cm. long; lobes 6, yellow bordered with red, narrowly lanceolate, acute at apex, broadened out at base,

thickened in a ridge within, twisted and reflexed in flower, 1.5—2 cm. long. *Stamens* 6; anthers linear, acute at apex, slightly spurred in front at base, 7—8 mm. long; the filaments as long. *Ovary* short, cylindric; style slender, geniculate below the top; stigma obliquely capitate. *Fruit* not known.

PERAK: in Upper Perak at 300 m. alt., Wray 3770!.

#### 4. LEPEOSTEGERES, Blume.

Parasitic shrubs. *Leaves* coriaceous, entire, exstipulate, opposite or sub-opposite. *Inflorescence* consisting of a sessile capitulum surrounded by sheathing imbricate involucre bracts, gradually lengthening upwards and sometimes with an inner series; flowers in each capitulum few—many, sessile on a flattened receptacle; bract to each flower 0; bracteoles 0—4, often elongate. *Calyx*-tube short, cylindric or angular, the limb entire or shortly lobed. *Corolla*-tube elongate sometimes cleft to the base, slender, the 5—6 lobes reflexed when open. *Stamens* 5—6 inserted at the mouth of the corolla-tube; anthers basifixed, linear or subulate; filaments slender. *Ovary* included in the calyx-tube; style filiform; stigma subclavate. *Fruit* as in *Loranthus*, etc.—DISTRIB. Malay Peninsula and Archipelago.

Bract and bracteoles of the flower absent; inflorescence up to 15 cm. long; corolla-tube very narrow, laciniate .. 1. *L. Beccarii*.  
 Bract none, bracteoles 4 up to 2 cm. long; inflorescence up to about 6 cm. long; corolla-tube funnel-shaped, split on one side .. .. 2. *L. Kingii*.

1. LEPEOSTEGERES BECCARII, Gamble. A glabrous parasitic shrub, the branches often very long, otherwise about 60—90 cm. high; branchlets stout, terete, greyish-brown, the younger quadrangular (at least when dry); nodes swollen. *Leaves* thinly coriaceous, opposite or sub-opposite; from ovate-lanceolate or ovate-oblong to suborbicular, very variable even on the same plant, subacute or obtuse at apex, cuneate or rounded at base; both surfaces dull, bluish-green when dry; 6—12 cm. long, 3—7 cm. broad; midrib fairly stout, scarcely visible on the upper surface; main nerves about 6 pairs, oblique, indistinct; secondary nerves occasional, obscure as is the reticulation; petiole moderately stout, 2—3 cm. long. *Inflorescence* lateral, from nodes on the old wood, of 20—30-flowered densely involucre sessile capitula, subglobose when young, afterwards strobiliform and much elongate (up to 15 cm.); involucre bracts large, numerous, imbricate, pale red, oblong to semi-

orbicular, obtuse, the inner 5—8 cm. long, the outer gradually shorter; receptacle obconic, flattened, bearing the closely packed sessile flowers; bracts and bracteoles to the flowers none. *Calyx*-tube angular, 4—5 mm. long, truncate, the limb a mere rim. *Corolla*-tube deep claret-colour, very slender, 7—10 cm. long, splitting into 6 very narrow linear yellow segments which are united for about 1 cm. at base and again slightly just below the twisted reflexed linear obtuse lobes, the lobes about 2 cm. long. *Stamens* 6; anthers linear, acuminate, very narrow, 12 mm. long, the cells lateral; filaments slender, 10 mm. long. *Ovary* cylindric, rounded at top; style filiform; stigma small, rounded. *Fruit* subangular, globose, 8 mm. in diam. *Loranthus Beccarii*, King in Journ. As. Soc. Beng., LVI. ii. 98 (1887). *Stegastrum Beccarii*, van. Tiegh. in Bull. Soc. Bot. Fr. XLII. 447. *Elytranthe Beccarii*, Engl. in Engl. & Prantl Nachtr. (1897) 126.

PERAK: at Gunong Ijuk, *Scortechini* 1208!; on the branches of trees at elevations up to 600 m. alt., *King's Collector* 5793!, 7956!; at Bujong Malacca, *Ridley* 9577!.—DISTRIB. Borneo (*Beccari* 1171; *Haviland* 3642!).

2. *LEPEOSTEGERES KINGII*, Gamble. A parasitic shrub; branchlets stout, terete, with smooth pale brown bark, the younger ones slightly lenticellate; nodes swollen. *Leaves* coriaceous, opposite; ovate-lanceolate, obtusely acuminate at apex, rounded and often unequal at base; both surfaces olive-green when dry, rather dull, smooth; 7—15 cm. long, 4—8 cm. broad; midrib stout, prominent; main nerves apparently 6—7 pairs, usually quite invisible on either surface as is the reticulation; petiole very stout, 1—2 cm. long. *Inflorescence* axillary, from new wood, of 4—6-flowered densely involucrate sessile capitula, up to about 6 cm. long, prominently 4-angled when young and strobiliform, afterwards elongate; involucre bracts large, red, keeled, the outer series of 6—7 decussate pairs, the uppermost of which are linear-oblong, obtuse, 3—4 cm. long, the lower gradually smaller and more acute, the inner series of a single lanceolate pair 2—2.5 cm. long; receptacle flattened, bearing the sessile flowers each of which has 4 linear-lanceolate acute keeled bracteoles about 2 cm. long. *Calyx*-tube angular, 2—3 mm. long, the limb unequally 6-toothed. *Corolla*-tube narrowly infundibuliform, 3—4 cm. long, curved below the middle, split nearly  $\frac{1}{2}$ -way down on one side and cleft at the apex into 5—6 lanceolate acuminate teeth which are at first reflexed and twisted and then upright and 1—1.5 cm. long.

*Stamens* 5—6; anthers subulate, acuminate, 5 mm. long, with a slight process at their bases; filaments as long as the anthers. *Ovary* cylindric; style filiform, as long as the stamens; stigma small, subcapitate. *Fruit* ovoid, elongate, crowned by the remains of the calyx-tube. *Loranthus Kingii*, Scortechini ex King in Journ. As. Soc. Beng. LVI. ii. 99 (1887).

PERAK: at Gunong Ijuk, *Scortechini* 1251!; camp on Ulu Batang Padang, 1500 m. alt., *Wray* 1526!. PAHANG: at Kwala Tenoh, Sunjie Tahan river, *Ridley's Collector* 2249!. MALACCA: *Maingay* K.D. 695!; at Selandan, *Ridley* 10771!; at Bukit Sedanan, *Goodenough* 1451!.

Goodenough says the flower is striped white and red, *Ridley's Collector* says, 'bright red with yellow-orange stripes,' *Ridley* and *Wray* say, 'red,' but the material seems to me to belong all to the same species though Sir G. King has named some of the sheets *L. Forbesii*. Stapf in Trans. Linn. Soc. Ser. 2. IV. 222 under his *Loranthus sabaensis* a species from over 3000 m. alt. on Mount Kinabalu in Borneo, doubts if *Maingay's* 695 really is *Scortechini's* plant. From the (only meagre) specimens of the type that I have examined I think it must be, but it is quite clear that further investigation on the spot is needful to clear up the point.

#### 5. GINALLOA, Korth.

Parasitic shrubs, growing on trees; branches dichotomous or whorled, jointed at the nodes, bearing, just above each node, a sheath-like thickening ending in a free ring. *Leaves* opposite, coriaceous. *Flowers* monœcious, in triads in terminal and axillary jointed spikes; bracts connate, cup-shaped, at the base of each joint of the spike, broadened in alternate spikes. *Perianth-tube* in ♂ 3-lobed, the lobes triangular-ovate, thick; in ♀ oblong, also 3-lobed, the lobes smaller and thinner. *Stamens* 3, opposite the perianth-lobes; filaments very stout, short; anthers ovoid, 2-celled, the cells opening by introrse longitudinal or curved slits. *Ovary* conform to the perianth-tube which encloses it; style none; stigma capitate; ovules 1—2. *Fruit* a 1-seeded berry; pericarp leathery enclosing a viscous layer surrounding the seed; perianth lobes persistent. *Seed* ovoid; testa thin; albumen fleshy, bearing the embryo at its apex; cotyledons very small; radicle minute, superior.—DISTRIB. Malay Peninsula, Andaman Islands and Ceylon (according to van Tieghem 9 sp.).

##### 1. GINALLOA SIAMICA, Craib in Kew Bull. 455 (1911).

Var. *Scortechinii*, Gamble. *Branchlets* terete, rather stout, the sheath-like thickening about 8 mm. long. *Leaves* very coriaceous,

ovate or ovate-oblong, somewhat falcate, obtusely acute at apex, unequally rounded or attenuate at base; 5—8 cm. long, 2—5 cm. broad; ribs 3, faint, other nerves and reticulation invisible; petiole stout, up to 7 mm. long, gradually broadening to the base of the blade. *Spikes* terminal, 5 cm. long or more; bracts joined in a cup embracing the rhachis. *Flowers*: ♂ not known, ♀ with 3 minute perianth-lobes surmounting the oblong perianth-tube enclosing the fruit.

PERAK: ? *Scortechini*!.

Only one sheet of this interesting plant is available and the material is very scanty. The branchlets and leaves resemble those of *G. siamica*, but that species has 5 nerves to the leaves; it is close enough, however, to be considered a 3-nerved variety and when more material is available it may prove to be a distinct species.

#### 6. KORTHALSELLA, van Tiegh.

Leafless parasitic shrubs, the branches jointed, furnished with bracteate scales at the joints, the joints all in the same plane. *Flowers* in the axils of the scales, monœcious, surrounded by tufts of hair, ♂ and ♀ with 3 perianth-lobes which are persistent after flowering in ♀. *Anthers* 3, 2-celled, cells opening by longitudinal slits introrsely but the anthers being connected at their margins the pollen issues by a central aperture. *Ovary* obovoid, placenta central, embryo basal, stigma small. *Fruit* an obovoid berry, the seed albuminous.—*DISTRIB.* India and Malaya, species according to van Tieghem, 61 (*Bifaria*); according to Engler much fewer.

1. KORTHALSELLA JAPONICA, Engl. in Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 138 (1897). A small tufted leafless parasitic shrub, yellow or brown when dry, reaching scarcely 15 cm. in height; branches flattened, contracted at the nodes, the internodes variable in length and breadth reaching 2—5 cm. in length and 5 mm. in breadth, obovate in shape and usually strongly keeled, not twisted but all in one plane. *Flowers* very minute, in dense clusters fascicled in cup-shaped bracts at the tips of the internodes and surrounded at base by short erect hairs, ♂ very few; perianth lobes 3, triangular, acute, concave, persistent in ♀. *Berry* ellipsoid or obovoid, 2—5 mm. long, fleshy. *Viscum japonicum*, Thunb. in Trans. Linn. Soc. II. 329 (1794); DC. Prodr. IV. 283; Hook. f. Fl. Br. Ind. V. 226; Trimen Fl. Ceyl. III. 472; Collett Fl. Siml. 440; Brandis Ind. Trees 552. *V. opuntia*, Thunb. Fl. Jap. 64. *V. articulatum*, Miq. Prol. Fl.

Jap. 297; Benth. Fl. Hongk. 141 and Fl. Austral. III. 396; Brandis For. Fl. 393 (not of Burm.). *V. moniliforme*, Wt. & Arn. Prodr. 380; Wight Ic. t. 1018 and Spic. Neelgh. t. 87; Kurz For. Fl. II. 325 (not of Bl.). *V. Wightianum*, Wall. Cat. 6877 (not of Wt. and Arn.).

KEDAH: on Gunong Jerai, *Ridley*!. MALACCA: on Mount Ophir, *Ridley* 3161!—DISTRIB.: India, Ceylon, China, Japan, Australia.

I have been unable to ascertain to which of his many species of *BIFARIA* the Malay Peninsula form of the old *Viscum japonicum* is attributed by van Tieghem. His *B. japonica* is restricted to the Japanese plant first collected by Thunberg in 1794: see Bull. Soc. Bot. Fr. XLIII. 173 (1896).

## 7. VISCUM, L.

Parasitic shrubs, growing on trees; branches usually dichotomous, sometimes whorled, jointed, the internodes terete angular or flattened. *Leaves* opposite, flat and thick or reduced to small scales, coriaceous. *Flowers* unisexual, small, fasciculate or solitary or usually in triads, in the axils of the leaves or at the nodes of the branches, rarely terminal; bracts small; bracteoles 2, free or connate in a cup. *Perianth*-tube in ♂ solid, in ♀ adnate to the ovary; lobes usually 4, very short, ovate or triangular. *Stamens* as many as the perianth-lobes and adnate to them, dehiscing introrsely by numerous pores. *Ovary* inferior, 1-celled; ovules solitary or paired; stigma sessile or subsessile. *Fruit* a succulent berry with soft viscid mesocarp. *Seed* adnate to the pericarp; albumen copious, solid; embryo terete, enclosed in the albumen, solitary or 2 to each seed. DISTRIB.: Temperate and tropical regions, species about 30.

Leafy shrubs, perianth-lobes deciduous (Sect. I.  
PLOIXIXIA, Korth.)

Leaves thin, ovate or lanceolate, often falcate, acuminate at apex; involucrel bracteoles acuminate, lateral flowers of triads ♀, central ♂ .. 1. *V. monoicum*.

Leaves thick, obtuse at apex; involucrel bracteoles obtuse, lateral flowers of triads ♂, central ♀.  
Upper internodes cylindric, striate; leaves coriaceous, more or less oblong; berry warted .. 2. *V. orientale*.

Upper internodes alternately flattened; leaves very coriaceous, obovate; berry smooth .. 3. *V. Wrayi*.

Leafless shrubs, perianth-lobes apparently persistent (Sect II. ASPIDIXIA, Korth.)

Articles 4—10 mm. broad; flowers comparatively large, in many fascicles; berry 5 mm. in diam .. 4. *V. dichotomum*.

Articles 2—4 mm. broad; flowers very minute in few fascicles; berry about 3 mm. in diam. .. 5. *V. articulatum*.



Articles 2 mm. broad; flowers very minute, in  
few fascicles; berry 2.5 mm. in diam. .. 6. *V. flexuosum*.

1. *VISCUM MONOICUM*, Roxb. Fl. Ind. III. 763 (1832). A parasitic shrub with numerous dichotomous or opposite branches; branchlets terete, slender, slightly thickened at the nodes, furrowed when dry. *Leaves* opposite, thinly coriaceous; ovate or lanceolate, often falcate, more or less acuminate at apex, attenuate at base; both surfaces glabrous, nearly black when dry; 3—5 cm. long, 1—2 cm. broad; 3—5-ribbed, the outer ribs slightly pedate; nerves few, reticulate; petiole none or very short. *Flowers* monœcious, in axillary sessile or very shortly (1 mm.) peduncled clusters of 1—3, supported by two ovate acuminate bracteoles combined in a shallow cup, the outer flowers of triads ♀ the central one ♂ or wanting; perianth 4-lobed, the lobes ovate—acute, those of the ♂ bearing the sessile anthers. *Ovary* oblong; style 0; stigma very short, conical. *Fruit* an oblong, smooth yellowish berry, truncate at apex. DC. Prodr. IV. 278; Brandis For. Fl. 393 and Ind. Trees 552; Wt. & Arn. Prodr. 379 (in note under *V. orientale*); Griff. Notul. IV. 637 and Ic. Pl. Asiat. t. 631; Kurz For. Fl. II. 324; Hook. f. Fl. Br. Ind. V. 224. Cooke Fl. Bomb. II. 552; Trimen Fl. Ceyl. III. 471; Prain Beng. Plants 912. *V. falcatum*, Wall. Cat. 492; DC. lc. *V. confertum*, Roxb. lc. *vide* Wt. & Arn. *V. bengalense*, Roxb. III. in Herb. Kew. t. 1181.

SIAMESE STATES: Kasoom, *Curtis* 3265!.—DISTRIB. India, Burma, Ceylon.

2. *VISCUM ORIENTALE*, Willd. Sp. Pl. IV. 737 (1805). A parasitic shrub with numerous dichotomous or opposite branches; branchlets terete or angular and grooved, glabrous, the ultimate ones often very slender; nodes thickened. *Leaves* opposite, fleshy-coriaceous; obovate or elliptic-oblong or lanceolate or linear-oblong, obtuse at apex, attenuately narrowed at base; both surfaces glabrous, black or brown when dry, 2—7 cm. long, 1—2.5 cm. broad; 3—5-ribbed, the outside ribs slightly pedate, often very short, and often looped above; nerves few, irregular, transverse; reticulation obscure; petiole none or very short. *Flowers* monœcious, in axillary, sessile or peduncled, clusters of 1—3, supported by two ovate bracts which are combined in a boat-shaped involucre; when in threes the central flower usually ♀, the outer ones much smaller and ♂, sometimes all ♂ or reduced to only one ♀; perianth 4-lobed, the lobes triangular, 1—5 mm. long in ♂, 1 mm. in ♀, in ♂ flowers one pair slightly larger than the other. *Anthers* 4, sessile by their connectives, often one pair larger than the other and more obtuse,

pores rather few. *Ovary* ovoid, stipitate, truncate; style short, conical; stigma capitate. *Berry* ovoid or subglobose, purplish red, rather prominently warted, as large as a pea, sessile or more or less stalked, the stalks up to 1—2 mm. long, thick. DC. Prodr. IV. 278; Wt. & Arn. Prodr. 379; Bl. Bijdr. 666 and Fl. Jav. Loranth. tt. 24, 25; Benth. Fl. Austral. III. 396; Wall. Cat. 491; Brandis For. Fl. 393 and Ind. Trees 552; Kurz For. Fl. II. 324; Hook. f. Fl. Br. Ind. V. 224; Cooke Fl. Bomb. II. 552; Trim. Fl. Ceyl. III. 471; Prain Beng. Plants 912; Miq. Fl. Ind. Bat. I. i. 804; Koord. Exkurs. Fl. Jav. II. 166. *V. verticillatum*, Roxb. Fl. Ind. III. 764.

PERAK: at lower camp, Gunong Batu Pateh, Wray 1074!; tea gardens, Ridley!. PAHANG: at Pulau Jellam, Ridley 2250!. MALACCA: at Merliman, Derry (?) 195!. SINGAPORE: Ridley 1827!, 3777!, 6816!, 10369!. 11392!.—DISTRIB. India, Burma, Ceylon, Java, Borneo (*Haviland* 3092!), China, New Guinea, Australia.

Var. *ovalifolium*, Miq. Fl. Ind. Bat. I. i. 805. *Leaves* larger, up to 8 cm. long, 5 cm. broad, often paler when dry, the 3 middle ribs prominent, the two side ones short and faint; flowers solitary in the involucre and more numerous and in closer fascicles in the leaf-axils; stigma shorter and broader. *V. ovalifolium*, Wall. Cat. 489; DC. Prodr. IV. 278; Kurz For. Fl. II. 325; Hook. f. Fl. Br. Ind. V. 225. *V. obtusatum*, Wall. Cat. 494; DC. l.c. 279.

KEDAH: at Pulau Songsong, Curtis 2599! PENANG: Wallich 489!; Penang Hill, Ridley 9373! PERAK: *Scortechini* 732!. MALACCA: Griffith K.D. 2739!, 2740!; Cuming 2341!; at Tanjong Kling, Ridley 3162!.—DISTRIB. Burma, Andamans, Siam (Kerr 818!).

3. *Viscum Wrayi*, King M.S. in Herb. Calc. ex Gamble in Kew Bull. 47 (1913). A parasitic shrub with rather stout dichotomous or opposite branches; branchlets terete, the uppermost with the internodes more or less flattened in alternate directions; nodes only slightly swollen. *Leaves* opposite, thickly fleshy-coriaceous, light yellowish green when fresh, nearly black when dry; obovate, rounded or slightly emarginate at apex, cuneate at base; both surfaces glabrous, slightly shining; margins recurved; 3—4.5 cm. long, 1—3 cm. broad; ribs 5, the outer ones pedately inserted, only slightly visible on the undersurface; other nerves and reticulation obscure; petiole 0. *Flowers* in axillary, shortly pedunculate, clusters of 1—3 supported by 2 connate ovate bracteoles forming a boat-shaped involucre, the middle flower ♀ on a 1 mm. long pedicel, the

two outer ♂ sessile; perianth 4-lobed, lobes ovate, acute, those of ♂ rather larger than those of ♀ and 1 mm. long. *Anthers* 4, sessile by their connective, with few (about 6–7) circular pores. *Ovary* oblong, contracted below the truncate mouth; stigma conical. *Berry* ovoid, pale green, truncate at apex, smooth, 5 mm. in diam.; seed ellipsoid, embryo oblique.

KEDAH: on Kedah Peak, *Ridley* 5847!. PERAK: at lower camp. Gunong Batu Putih *Wray* 1111!.

The anthers in this species, at any rate in the specimens available, are very difficult to make out. They seem at first sight to open longitudinally, but a high power shows the minute pores.

4. *VISCUM DICHOTOMUM*, D. Don Prodr. Fl. Nep. 142 (1825). A leafless pendulous much di-trichotomously branched parasitic shrub, yellow or brown when dry; branches terete, branchlets jointed at the nodes and easily separating when dry, the internodes (articles) flattened, longitudinally (about 5–9-) ribbed, slightly narrowed above attenuate below, each article at right angles to its neighbour but twisted near the base so that all appear to be in one plane; 1.5–4 cm. long, 4–10 mm. (—15 mm. *Koord.*) broad. *Flowers* small, in axillary fascicles of 1–3, when 3 the central flower of the triad usually ♀ the outer ones ♂, triads supported by a pair of connate cup-shaped bracts, the ♀ again bibracteolate the bracteoles 1.5 mm. long; perianth lobes 4, ovate, 1.5–2 mm. long, those of ♂ spreading those of ♀ erect usually deciduous. *Anthers* adnate to the middle of the perianth-lobes, one pair rather larger than the other and more obtuse, pores rather large and conspicuous. *Ovary* cylindrical, smooth, truncate; stigma capitate. *Berry* globular, dull white, smooth, 5 mm. in diam.; seed rugose. DC. Prodr. IV. 284; Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 140. *V. articulatum*, Burm. var. *dichotomum*, Kurz For. Fl. II. 325; Hook. f. Fl. Br. Ind. V. 226; Cooke Fl. Bomb. II. 553. *V. articulatum*, Collett Fl. Siml. 440, t. 143. *V. elongatum*, Wall. Cat. 495; DC. l.c. *V. opuntiioides*, Willd. Sp. Pl. IV. 740; Roxb. Fl. Ind. III. 764; Wall. Cat. 496.

PROVINCE WELLESLEY: at Tassik Glugor, *Curtis*!. PERAK: up to 100 m. alt., *King's Collector* 4191!; at Simpang, *Wray* 2023!; *Scortechini* 603!. MALACCA: *Griffith* K.D. 2742!; *Hervey*!. JOHORE: at Bukit Imlyn, *Ridley*!.—DISTRIB. India, Burma.

I have thought it best to follow Engler in retaining this species, not only on account of the broader articles of the stem for these vary very much, but on account of the larger and more conspicuous flowers and fruits.

5. *VISCUM ARTICULATUM*, Burm. Fl. Ind. 311 (1768). A leafless pendulous much di-trichotomously or verticillately branched parasitic shrub nearly black when dry; branches terete, branchlets jointed at the nodes and easily separating when dry, the internodes (articles) flattened, longitudinally (about 5-) ribbed and narrowed at the ends, each article at right angles to its neighbour, but twisted near the base so that all appear to be in one plane, 1.5—3.5 cm. long, 2—4 mm. broad. *Flowers* very minute, in axillary fascicles (often only one) of triads of which the central flower is usually ♀ the outer ones ♂, triads supported by a pair of connate cup-shaped bracts, the ♀ again bibracteolate, the bracteoles 1 mm. long; perianth-lobes 3—4, triangular, acute, persistent, those of ♂ reflexed, those of ♀ erect. *Anthers* adnate to the bases of the perianth-lobes, at first joined in a central mass, afterwards separate and with very minute pores. *Ovary* cylindric, smooth; stigma small, rounded. *Berry* globular, smooth, glassy-white or yellowish, about 3 mm. in diam. DC. Prodr. IV. 284; Miq. Fl. Ind. Bat. I. i. 806; Kurz. For. Fl. II. 305 (*excl.* citation of Brandis For. Fl.); Hook. f. Fl. Br. Ind. V. 226; Engl. & Prantl Naturl. Pflanzenfam. Nachtr. 140; Koord. Exkurs. Fl. Jav. II. 167; Cooke Fl. Bomb. II. 553. *V. fragile*, Wall. Cat. 498 B. *V. compressum*, Poir. Encycl. Suppl. II. 861; DC. l.c.; Blume Fl. Jav. Loranth. t. 24. *V. aphyllum*, Griff. Notul. IV. 634 and Ic. Pl. Asiat. t. 630.

PENANG: on Penang Hill, *J. Scott*!; at 300—750 m. alt., *King's Collector* 1686!; on Government Hill, *Curtis* 2151!. MALACCA: *Maingay* K.D. 697!; *Cuming* 2258!. SINGAPORE: at Chanchukang, etc., *Ridley* 8054!.—DISTRIB. India, Burma, Java.

6. *VISCUM FLEXUOSUM*, King M.S. in Herb. Calc. ex Gamble in Kew Bull. 47 (1913). A leafless pendulous much di-trichotomously branched parasitic shrub reaching 2—3 ft. in length, olive brown when dry; branches terete, yellowish; branchlets very slender, jointed at the nodes, the internodes (articles) slightly flattened, longitudinally 1—3-ribbed, linear, scarcely attenuate, each article at right angles to its neighbour but twisted so that all appear to be in one plane; 1.5—2.5 cm. long, 2 mm. broad. *Flowers* minute, in axillary pairs of triads or single, the triads supported by a pair of connate shallow bracts and consisting of a central ♀ flower and two outer flowers of which one or both ♂; the ♀ again bibracteolate, bracteoles .75 mm. long; perianth lobes 3—4, exceedingly minute, scarcely .25 mm. longer in ♀ less in ♂, erect, deciduous. *Anthers*

adnate to the perianth lobes, pores very minute. *Ovary* ovoid, smooth, truncate; stigma very small, rounded. *Berry* globular, glassy white, 2.5 mm. in diam.

SINGAPORE: *King's Collector* 1187!; *Tauglin*, etc., *Ridley* 6018!, 8912!; *Murton* 151!.

#### 8. NOTOTHIXOS, Oliver.

Parasitic hoary or tomentose shrubs, growing on the branches of trees or on other *Loranthaceae*; branches dichotomous. *Leaves* opposite, flat, more or less coriaceous, ribbed. *Flowers* minute, monoecious, in terminal spikes or sessile and uniseriate in a row of 3—7 on the margins of a flattened receptacle supported by a pair of small bracts, the said receptacles pedunculate, single or in threes or more in a cyme in the forks of the branchlets; sometimes the ♂ flowers in separate heads near the ends of the branchlets, the ♀ flowers in separate heads lower down, sometimes ♂ and ♀ mixed in the same row. *Perianth-tube* in ♂ short and solid, in ♀ adnate to the ovary; lobes 4 rarely 3 or 5, small, triangular, valvate. *Stamens* in ♂ flowers attached to the bases of the perianth lobes around the sinuate margins of a flattened disk; filaments short or none; anthers erect, broad, dehiscing introrsely by circular pores. *Ovary* in ♀ flowers inferior, crowned by a fleshy disk; stigma subsessile; ovule solitary, at first not apparent. *Fruit* a 1-seeded berry, the pericarp viscid within. *Seed* oblong, on a basal cup-shaped placenta; testa very thin; embryo pendulous in a fleshy albumen, the radicle thickened, the cotyledons short, linear. **DISTRIB**: Ceylon, Malaya and Australia; species about 5.

Branchlets, leaves and inflorescence covered with golden

mossy tomentum .. .. . 1. *N. subaureus*.

Branchlets, leaves and inflorescence covered with greyish-

tawny stellate tomentum .. .. . 2. *N. Malayanus*.

1. NOTOTHIXOS SUBAUREUS, Oliv. in Journ. Linn. Soc. VII. 103 (1864). A parasitic shrub, the young parts, inflorescence and under surface of the leaves densely covered with a golden mossy floccose tomentum; branchlets terete, yellow, striate when dry, the nodes swollen. *Leaves* ovate or elliptic-ovate or ovate-lanceolate, obtuse or acute at apex, narrowed at base; upper surface shining, lower densely stellately floccose-tomentose; variable in size, 2—6 cm. long, 1—3.5 cm. broad; 3-ribbed from the base, the nerves and reticulation not visible; petiole 0—3 mm. long. *Heads* usually 5- or

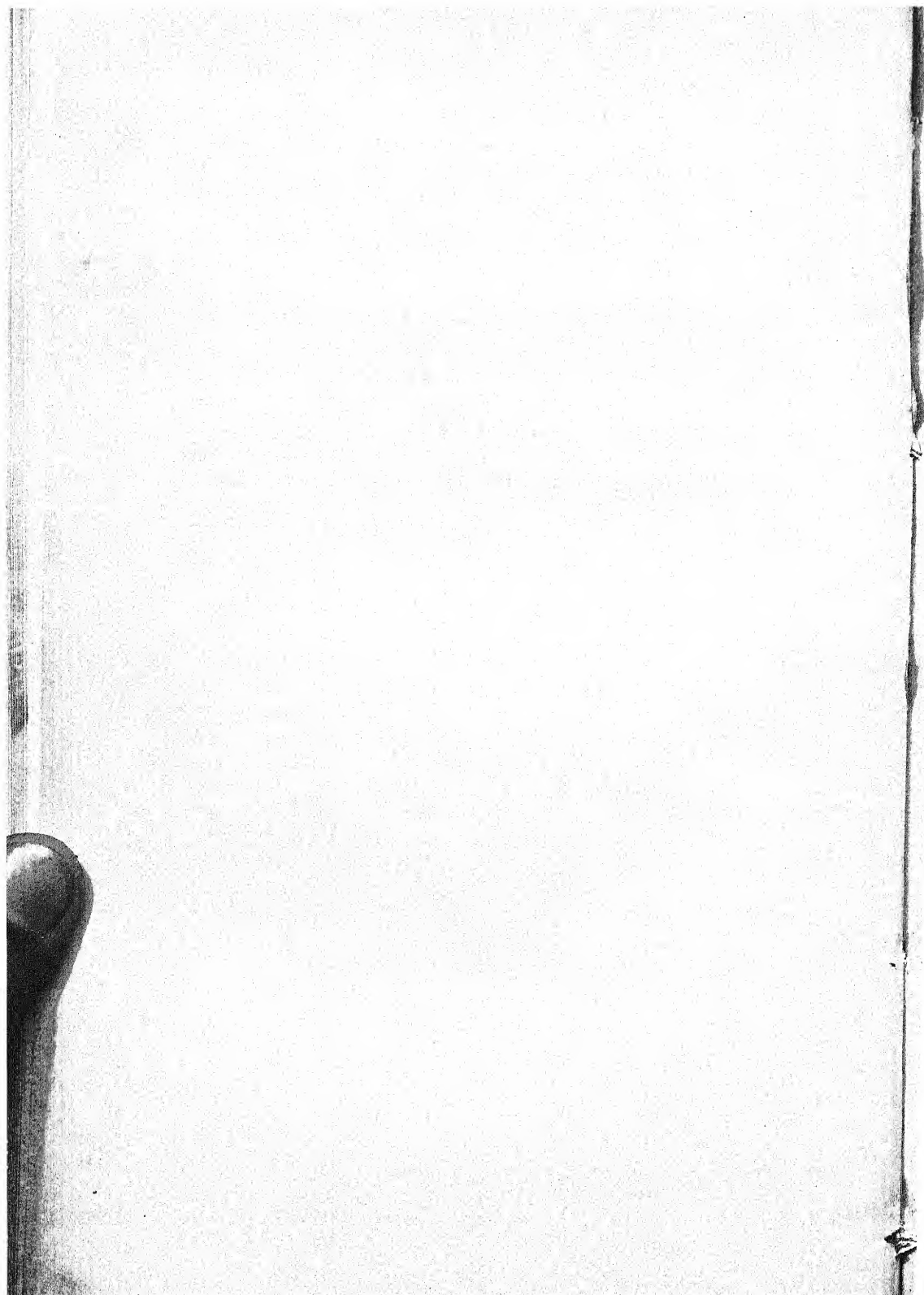
more-flowered, the flowers uniseriate, usually 1 flower only ♂ the rest ♀; bracts ovate acute; peduncle 4—5 mm. long, often secund. *Perianth*-lobes triangular, usually 4. *Stamens* exceedingly minute, filaments as long as the broadly ovate obtuse anthers which open by about 5—7 pores. *Berry* ovoid-oblong, densely floccose-tomentose. Benth. Fl. Austral. III. 397. *Viscum subaureum*, F. Muell. in Herb. Hook.

PERAK: at Logon, *Herb. Mus. Perak* (*Scortechini?*)!.—DISTRIB. Australia, New Guinea (*H. O. Forbes* 779!).

2. *NOTOTHIXOS MALAYANUS*, Oliv. in Hook. Ic. Plant. t. 1519 (1886). A parasitic shrub, the young parts, inflorescence and under surface of leaves covered with a greyish-tawny tomentum of more or less stellate hairs; branchlets terete, the bark with prominent longitudinal cracks; the nodes flattened. *Leaves* obovate or suborbicular, rounded and slightly apiculate at apex, attenuate at base; upper surface dull, lower tomentose; 2—4 cm. long, 1—2.5 cm. broad; 3-ribbed from the base, the nerves and reticulation not visible; petiole 0—4 mm. long. *Heads* usually 5—7-flowered, the flowers uniseriate; usually 1—2 flowers only ♂ the rest ♀; bracts minute, ovate, acute; peduncle 4 mm. long, erect. *Perianth*-lobes 4, triangular-ovate. *Stamens* very minute; filaments very short; anthers broadly ovate, obtuse, opening by a circle of pores near the margins. *Berry* ovoid-oblong, stellate-tomentose.

PENANG: at Tulloh Babang, *Curtis* 233!.





*Materials for a Flora of the Malayan Peninsula*, No. 25.—By J. SYKES  
GAMBLE, C.I.E., M.A., F.R.S., late of the Indian Forest  
Department.

This Part contains the Families No. 93 (*bis*) Cytinaceæ and 109 Balanophoraceæ both by Mr. H. N. Ridley, C.M.G., F.R.S., late Director of the Botanic Garden at Singapore; also Nos. 112 Juglandaceæ, 113 Myricaceæ, 114 Casuarinaceæ, 115 Fagaceæ and 116 Salicaceæ all by Mr. Gamble. In these 7 Families there are 11 genera and 65 species, of which 1 species in Balanophoraceæ and 8 in Fagaceæ are new. The new species have been described, with the usual Latin diagnoses, in the Kew Bulletin.

Family XCVI *bis* CYTINACEÆ.

By H. N. RIDLEY.

Parasitic fleshy herbs, leafless or with a number of scales scattered or imbricate, reduced to a single subsessile flower or with a more or less evolute flower spike. *Flower* unisexual or hermaphrodite, fleshy, campanulate, the tube adnate to the ovary, above broken up into from 3 to 12 lobes. *Stamens* usually innumerable; anthers sessile round the central column, bilocular. *Ovary* inferior or half superior, unilocular or with multilamellate placentas imperfectly plurilocular; stigma single, entire, cupshaped or discoid, or on numerous styles on the top of the ovary or column; ovules very numerous on parietal placentas or pendulous from the apices of loculi, orthotropous or anatropous. *Fruit* fleshy, unilocular, indehiscent or irregularly dehiscent. *Seeds* minute, albuminous —  
DISTRIB. Genera 7, species about 25; in temperate or tropical regions of Europe, Asia, Africa and America.

- |   |    |                |
|---|----|----------------|
| Flower solitary, lobes 5; stigmas numerous          | .. | 1. RAFFLESIA.  |
| Flower solitary, lobes numerous; stigma one, large, |    |                |
| cupshaped .. .. .                                   | .. | 2. BRUGMANSIA. |

1. RAFFLESIA, R. Br.

Fleshy unisexual plants, parasitic on woody climbers, stemless, with ovate bracts at the base of the flower adnate to the ovary. *Perianth* very large, fleshy, dull red, fœtid; tube hemispheric, limb 5-lobed; lobes imbricate, spreading, broad, obtuse, glabrous,

with an elevated annular corona in the mouth. *Genital column* short, thick, with a single or double ring surrounding it; apex flat, discoid, with numerous styliform processes. *Male flower* with a single series of anthers surrounding the neck of the column; anthers globose, sessile, opening by a single terminal pore; styli-form processes glabrous. *Female flower* similar, but anthers abortive or absent and styliform processes hairy at the tip. *Ovary* inferior with numerous labyrinthiform placentas; ovules numerous, anatropous. *Seeds* very numerous, minute.—**DISTRIB.** Species about 6, in the Malay Peninsula and Archipelago from Sumatra to the Philippines.

1. *RAFFLESIA HASSELTII*, Suring. Act. Soc. Reg. 1879. *Perianth* about 45 cm. across; scales at base numerous, ovate, rounded, about 1.5 cm. long; tube broad, campanulate, short, covered inside with slender branched processes, upper ones near the mouth unbranched and clubbed; lobes and corona bright Indian-red with dull white irregular elevated blotches scattered over them, lobes oblong, truncate, spreading. *Genital column* thick with one elevated ring, base vertically ribbed; anthers in male flower 20; styli-form processes 15 to 17, tapering upwards, 2 cm. long, (when dry) white. Hasselt & Boerlage in Veth, Midden-Sumatra, IV. ii. Flora t. 1, 2; Solms-Laubach, Ann. Jard. Buitenz IX 239 and in Engl. Pflanzenreich, *Rafflesiaceæ*, p. 9; Engl. & Prantl. Natürl. Pflanzenfam. III. i. 279, t. 178.

**PERAK:** Taiping hill forests, *Cantley*, *Wray*; Temengoh Woods, *Ridley*.—**DISTRIB.** Sumatra.

Solms-Laubach in Herb. Kew. labels this *R. Cantleyi*, sp. nov., but seems never to have published any description of it or referred to it in his Monograph in the Pflanzenreich. I cannot distinguish it from *R. Hasseltii*. It occurs sporadically in the dense forests and is used by the Malays as a drug under the name of 'Kerubut.' It emits only a faint odour of carrion.

## 2. *BRUGMANSIA*, Bl.

Fleshy unisexual or bisexual plants, parasitic on woody creepers, leafless and stemless, with ovate obtuse bracts. *Perianth* smaller than in *Rafflesia*, fleshy, coriaceous; tube adnate to the ovary, above campanulate; lobes elongate, acuminate, induplicate-valvate, five or six, splitting two or three times when expanded, outside glabrous, inside hairy. *Genital column* cylindric; anthers numerous in a single ring below the large cupshaped hairy

stigma, opening by 2 pores. *Ovary* inferior, unilocular; ovules very numerous, on numerous indefinite placentas. *Seeds* minute.—**DISTRIB.** Species 2, one Japanese, and one in Sumatra, Borneo and the Malay Peninsula.

1. *BRUGMANSIA* LOWII, Becc. in Atti Soc. Ital. Sc. Nat. xi. 198 (1868), and Nuov. Giorn. Bot. Ital. (old series) I, 84, t. v and vii, t. 74.

Unisexual. *Perianth* dark brownish-red, about 2 cm. tall and 14 cm across; tube glabrous within; lobes covered with long reddish hair, deflexed, acuminate, 14 to 16 in number when fully expanded. *Column* shortly stipitate; anthers numerous, in the male flower 2-celled, in the female abortive. *Stigma* large, cup-shaped, hairy. Fawcett Trans. Linn. Soc. II, 244, t. 36; Solms-Laubach Pflanzenreich l. c. p. 10.

**PAHANG:** at Kwala Tembeling, Ridley.—**DISTRIB.** Sumatra (*Forbes*), Borneo in Sarawak and Limbang (*Beccari*), Serinokok (*Everett*).

Very foetid. Everett in litt. says, "It is dark brownish red and exactly resembles a piece of hairy skin. It exhales a putrid odour, and on its being taken into the house, flies were immediately attracted to it and laid their eggs on it. These eggs were hatched out in due time, and the maggots after wandering about the flower died."

## Family CIX. BALANOPHORACEÆ.

By H. N. RIDLEY.

Parasitic herbs with a tuberous rhizome and leaves reduced to scales, or bract-like. *Flowers* small, in unisexual or bisexual spikes. *Perianth* of male flowers of 3 to 8 valvate lobes or wanting. *Stamens* 1 to many, filaments free or usually connate, anthers bilocular or 4- to many-locular, often connate. *Perianth* of female flower usually 0, or tubular, or lobed. *Ovary* globose ellipsoid, sessile or stalked, 1- to 3-locular; styles 1 or 2; ovules solitary in the loculi. *Fruit* small, resembling the ovary, one-celled, one-seeded.—**DISTRIB.** Genera 14, species about 40; in the tropics of both hemispheres, Europe and New Zealand.

Styles solitary,

Female flower naked .. ..

1. *BALANOPHORA*.

Styles 2,

Female flower with tubular perianth .. ..

2. *RHOPALOCNEMIS*.

## 1. BALANOPHORA, Forst.

Fleshy, red or yellow herbs with a tuberous warty rhizome. *Peduncles* cylindric with large scale leaves, or subfoliaceous yellow leaves. *Spikes* unisexual or bisexual, ovoid or cylindric, dense-flowered. *Perianth* of male flowers stipitate, with 3 to 6 lobes, ovate or oblong, valvate. *Stamens* 3 to many; filaments connate in a cylinder; anthers bilocular with bilocellate loculi or connate into a 3- to many-locellate mass. *Perianth* of minute female flowers 0, the flowers sessile on the receptacle or on the stipes of fleshy cellular bodies (spadicels). *Ovary* ellipsoid with a slender hair-like style and terminal stigma; ovule solitary, pendulous. *Seed* very minute, globose.—DISTRIB. Species about 15, in Tropical Asia and Australia.

*Spikes* unisexual, red.

Anther cells 5, hippocrepiform .. .. 1. *B. gigantea*.

Anther cells more than 5, linear

Rhizome branched, pustular; anther cells 20 or more .. .. 2. *B. multibrachiata*.

Rhizome tuberous not pustular; anther cells about 12 .. .. 3. *B. globosa*.

*Spikes* slender, unisexual, yellow; perianth lobes in two dissimilar pairs .. .. 4. *B. truncata*.

*Spikes* bisexual, yellow, slender .. .. 5. *B. insularis*.

1. BALANOPHORA GIGANTEA, Wall. Cat. 7249 (1828). *Rhizome* tuberous, 15 cm. through, tessellate, not pustulate, dark orange colour, subterranean, bluntly lobed. *Peduncles* up to 10 cm. tall, covered by numerous ovate or lanceolate subcoriaceous obtuse deep red scales. *Male spike* cylindric-conic, densely flowered, the flowers sunk in alveoli, the pedicels as long as the perianth, white. *Perianth-lobes* linear oblong, equal, their apices truncate, incurved, 7 mm. long, bases white, tips deep red. *Androecium* white, compressed, cylindric, obtuse, cells horse-shoe-shaped, 5 ('4 to 6' Fawcett). *Female spike* shortly peduncled, obovoid, top rounded, 3 cm. long, 2 cm. across. *Spadicels* oblong-cylindric, obtuse, stipitate; female flowers borne on the stipes of the spadical and shorter than it. Fawcett Trans. Linn. Soc. Ser. 2, II, 325, t. 33, fig. 5-7.

PERAK: Ulu Batang Padang near Telom, in dense forest, Ridley, at Kinta G(unong) M(alaka?) King's Collector 7199. SELANGOR: on the roots of a large fig tree, Semangkoh Pass, Ridley 8520.—DISTRIB Burma, Tonkin.

Kunstler describes the colouring of the plant as light yellow, the stem and leaves as fleshy, the flowers sulphur yellow, calyx deep red. I have described it according to my field notes. It was referred by Hooker fil. 37

Brit. Ind. V. 238 to *B. indica*, Wall. from which I consider it to be distinct, as does Fawcett.

2. *BALANOPHORA MULTIBRACTEATA*, Fawcett in Trans. Linn. Soc. Ser. II. ii. 236, t. 34, fig 15--18 (1886). *Rhizome* dichotomously branched with subterete branches, scarlet, tessellate and sprinkled with papillae; branches about 1 cm. through, the erect flowering ones 3--4 cm. long, broken up at the top into 5 or 6 rounded lobes. *Male spike* 6 cm. long, shortly stalked, lax-flowered, with a few scale-leaves at the base. *Pedicels* 5 mm. long. *Perianth-lobes* 4, linear oblong, obtuse, about 5 mm. long. *Androecium* short, flattened, oblong, with over 20 linear narrow straight cells. *Female spike* shortly oblong, globose, 2 cm. long, 1 cm. wide, shortly peduncled, with a few broad scale-leaves at the base. *Spadicels* oblong, sessile. *Female flowers* very slender on a receptacle about as long.

PAHANG: Gunong Iran, and Telom, Ulu Batang Padang, Ridley, Kloss and Robinson.—DISTRIB. Sumatra.

The branching scarlet rhizome largely above ground and resembling scarlet coral makes this a very beautiful and distinct plant.

3. *BALANOPHORA GLOBOSA*, Jungh. in Nov. Act. Acad. Caes. Nat. Cur. XVIII. Suppl. i. 210, t. 2 (1841). *Tuber* subterranean, often large 15 cm. through, light brown, tessellate, not pustular, yellow within; branches numerous, short, broad, cone-shaped, split at the top into irregular lobes. Plants unisexual, spikes on very short peduncles, 2--3 cm. long, covered with numerous coriaceous ovate obtuse dark red scales. *Male spike* 2 cm. long, shortly protruding from the scales, red; rhachis rather stout with broad truncate horse-shoe-shaped bracts; the flowers sunk in alveoli, very short, 4 mm. long, shortly stalked. *Perianth-lobes* 5, oblong, truncate, tips incurved. *Androecium* ellipsoid, flattened, with about 12 vertical linear cells. *Female spike* ellipsoid, subglobose, with a broad rounded top, 2 cm. long, hardly protruding from the scales. *Spadicels* oblong, obtuse, sessile, rather large. *Female flowers* shorter, borne on the receptacle.

PERAK: Ulu Batang Padang, Telom, Ridley. PAHANG: Gunong Tahan, Robinson 5413, up to 1800 m. elevation; K'luang Terbang, Barnes. SELANGOR: Semangkoh Pass at from 600 to 1200 m. alt., Ridley. MALACCA: Mt. Ophir, Ridley; Maingay K.D. 1240.—DISTRIB. Java.



The commonest species in the Peninsula, parasitic on coniferae, *Dacrydium*, etc. Junghuhn only describes and figures the female, but I have little doubt that this is the plant he intended. A rhizome from Java from De Vriese, who calls it *B. globosa*, is identical with the Peninsular species. Fawcett, however, refers it to his species *B. ramosa*.

4. *BALANOPHORA TRUNCATA*, Ridl. in Journ. Linn. Soc. XLI, 296 (1912). *Rhizome* tuberous, as large as the fist, deeply buried, tessellate and papillose, not pustular. *Male flower stems* 7 to 20 cm. long, slender, dirty yellow. *Leaves* sheathing the basal portion 3 to  $\infty$ , rather distant, lanceolate, obtuse to oblong, 2 to 3 cm. long. *Flower spike* lax, slender, 4—9 cm. long; flowers sessile, transversely oblong, 5 mm. wide by 2 mm. across. Outer *perianth-lobes* 2, transversely oblong, inner pair linear oblong, much narrower, obtuse, truncate, yellow. *Androecium* white, transversely oblong; cells parallel, linear, very numerous. *Female flower spike* not seen.

PERAK: Ulu Batang Padang at about 900 m. elevation, parasitic on a woody climber, *Ridley*. SELANGOR: Mt. Menuang Gasing between 900 and 1500 m. elevation, *C. B. Kloss*.

This is allied to *B. polyandra*, Griff., but is more slender and with very differently shaped perianth lobes.

5. *BALANOPHORA INSULARIS*, Ridl. in Journ. Roy. As. Soc. Str. Br. XLV. 218 (1905). *Rhizome* rather small, about 2 in. through, nodular and warted. *Stems* one or more with a small volva split into 4 or 5 rounded lobes at the base, 8—9 cm. tall, entirely lemon yellow, 3 mm. thick. *Leaves* oblong, linear, blunt, 2 cm. long, 1 cm. wide, tips often denticulate. *Spike* with scattered male flowers at the base; apex ellipsoid-ovate, female. *Male flowers* 1 mm. across; perianth lobes oblong, truncate, upper and lower ones longer and wider than the lateral ones. *Androecium* transversely oblong, cells 7—8, hexagonal. *Female flowers* shortly stalked, with numerous obovate tailed spadicels; ovary obovoid, minutely pustulate.

PERAK: Lenggong, *Ridley*. PAHANG: East coast on Pulau Aur, *Feilding*.—DISTRIB. Christmas Island.

## 2. RHOPALOCNEMIS, Jungh.

Fleshy parasitic herbs, yellow or red. *Rhizome* tuberous or elongate, scales and leaves absent. *Spikes* unisexual, sessile or stalked, cylindric, many-flowered. *Flowers* of both sexes minute, imbedded in a mass of filiform cellular hairs; bracts peltate, conic,

stalked, angled, umbrella-shaped, covering the spikes at first, then deciduous. *Male flowers* infundibuliform with lacerate margins, or of 4 obcuneate oblong truncate lobes; stamens 3, connate, anther-cells numerous, linear, connate. *Female flower*: perianth tubular or bilobed, lobes rounded; styles 2, stigmas discoid; ovule 1, pendulous. *Seed* globose, albumen thin, embryo large.—**DISTRIB.** Species 2. One in Java and the Himalayas and one in the Malay Peninsula.

1. *RHOPALOCNEMIS RUFICEPS*, Ridl. in Kew Bull. 188 (1914). *Rhizome* elongate, terete, over 15 cm. long, branched, 5 mm. through, yellow becoming orange-brown outside. *Leaves, scales and volva* none. *Stems* columnar, terete, 8—10 cm. long, 7 mm. through, yellow with brown transverse streaks. *Capitulum* ovoid to cylindric, 4—10 cm. long, 2—3 cm. through, rose pink covered with bright red bracts; bracts stipitate, cone-shaped, 4- to 6-angled (when dry), 5 cm. long and 4 mm. across the widest part; soon deciduous. *Male flowers* 2 mm. long, perianth lobes 4, oblong, truncate, shortly connate at the base; androecium shorter, column thick; anthers ellipsoid in an obtuse oblong head with about 8 linear loculi. *Female flowers* minute, flattened; perianth elliptic, tubular; styles 2, stigmas discoid. Hairs in both sexes very numerous, dense, enclosing the flowers.

**PENANG**: *Stoliczka* (in herb. Calc.); Penara Bukit, *Ridley*.  
**PERAK**: Taiping Hills in dense forest, Low, *Ridley, Anderson*.

Very distinct from the only other described species, *R. phalloides*, Jungh., in the slender creeping rhizome, the absence of any volva, the tall cylindric peduncle and cylindrical red capitulum.

## Family CXII. JUGLANDACEÆ.

Trees, usually large, with hard wood, often strongly aromatic. *Leaves* alternate, pinnate, stipules 0. *Flowers* monoecious: ♂ in catkins in simple or paniculate pendulous spikes; perianth 0 or of 3—6 lobes adnate to the bract: ♀ in erect, sometimes afterwards pendulous, few- or many-flowered spikes or racemes; perianth 4-lobed, superior; bract inferior, often enlarged in fruit. *Stamens* 2 or more, on the perianth-lobes; anther-cells parallel; filaments very short or 0. *Ovary* inferior, 1-celled; ovule solitary, erect, orthotropous; style short; stigmas 2, short sessile or long, lacinate. *Fruit* a drupe or nut, naked or clothed with the marcescent bract and perianth-lobes; pericarp fleshy or succulent; endocarp hard, bony

or crustaceous, sometimes dehiscent, with sinuously inflexed inner walls and 2—4 basal pits within. *Seed* basifixed, 2—4-lobed at base; albumen 0; cotyledons equal, sinuous or subfoliaceous and contorted; radicle superior.—*DISTRIB.* Genera 5, chiefly in North Temperate regions, a few species tropical.

### 1. ENGELHARDTIA, Lesch.

Trees, often of large size. *Leaves* pinnate, the leaflets entire or serrate often with the under surfaces covered with glandular scales. *Flowers* monœcious, in paniculate spikes or racemes, usually the lower branches ♂, the terminal one ♀, sometimes the ♂ lateral or axillary on the wood of the previous year, the ♀ from the axil of the new year's shoots; ♂ erect or pendulous, ♀ pendulous; both ♂ and ♀ supported by bracts, which in the ♀ are persistent and become expanded in fruit. *Perianth* in ♂ irregularly but usually 4-lobed, in ♀ usually 4-lobed and surmounting the ovary. *Stamens* 4—12, subsessile on the perianth lobes. *Ovary* inferior, 1-celled, 1-ovuled; ovule erect, orthotropous; style short; stigmas 2, short, sessile or long lacinate and inwardly stigmatose, often 2 fid. *Fruit* a small globose nut, adnate to the much enlarged, 3—6-lobed, scarious, net-veined bract, three lobes usually much elongate, the mid-lobe the longest; epicarp or perianth-tube thin, stiffly hirsute or covered with glandular scales; endocarp 2-valved. *Seed* 2—4-lobed at the base, the cotyledons rugosely folded and contorted.—*DISTRIB.* Species 6 (if *E. aceriflora* and *E. Colebrookiana* are considered as varieties of *E. spicata*) in India, China and the Malay Peninsula and Archipelago.

Fruit covered with acicular hairs; perianth of ♂ flowers irregular.

Fruiting bract 4-lobed, cupshaped at base, the inner lobe obtuse, short, crenate or emarginate, the 3 outer much enlarged; leaves large, up to 30 cm. long, usually membranous ..

1. *E. spicata*.

Fruiting bract 3-4-lobed, cleft within to the base, the inner lobe short, acute, the 3 outer much enlarged; leaves up to 15 cm. long, coriaceous ..

2. *E. nudiflora*.

Fruit covered with glandular scales; perianth of ♂ flowers regular, 4-lobed; fruiting bract 3-lobed, cleft within to the base, the inner lobe absent, the outer 3 much enlarged; leaves coriaceous, 20—30 cm. long.

3. *E. Wallichiana*.

1. *ENGELHARDTIA SPICATA*, Blume Bijdr. 528 (1826) and Fl. Jav. Jugland, 8, tt. 1 and 5A (1828). A large subdeciduous tree,

reaching in Java 30 m. or more in height; branchlets greyish brown, lenticellate, the uppermost more or less pubescent and often with rounded glandular scales. *Leaves* paripinnate with 3—7 pairs of opposite or subopposite leaflets, membranous or chartaceous, up to 30 cm. long in all, petiole 5—10 cm. long; leaflets petiolulate or subsessile, elliptic-oblong or -ovate, acute or acuminate at apex, rounded or attenuate, usually unequally, at base; margins entire; both surfaces smooth, olive brown when dry, the under sometimes softly pubescent; 10—18 cm. long, 4—6 cm. broad; main nerves 10—12 pairs, curving to near the margin, reticulation areolate. *Flowers* in slender pendulous pubescent spikes: ♂ spikes up to 30 cm. long, deciduous; bracts entire or trifid, at apex bearing 3 or more irregular oblong perianth-lobes embracing the stamens, the end lobe often elongate; stamens in two rows of about 6 each, anthers oblong, hispid, shortly apiculate, filaments very short: ♀ spikes also up to 30 cm. long; bract cup-shaped, 5-lobed, the lobes unequal; perianth-lobes 4—5, narrow, superior, persistent and often reflexed; ovary, as also the base of the bract, densely clothed with stiff acicular hairs; style short, stigmas 4, slender, papillose. *Fruit* a globose crustaceous nut, 5 mm. in diam., covered with stiff acicular hairs and crowned with the persistent perianth-lobes and style; cupular bract scarious, embracing the base of the nut, 4-lobed, the 3 outer lobes much enlarged, the midlobe obovate or spatulate, 3—4 cm. long, up to 1—5 cm. broad, the 2 side lobes similar but only half as long, the inner lobes short emarginate or crenate, about 5 mm. long, the whole involucre prominently net-veined and glabrous. C. DC. Prodr. XVI. ii. 140; Kurz For. Fl. II. 491; Miq. Fl. Ind. Bat. I. i. 842; Hook. f. Fl. Br. Ind. V. 595; Engl. & Prantl Naturl. Pflanzenfam. III. i. 24, Figs. 19 B, 20 B; Koord. & Val Bijdr V. 165; Koord. Exkurs. Fl. Jav. II. 51; Brandis Ind. Trees 620; Prain Beng. Plants, 984. *E. Roxburghiana*, Lindl. in Wall Pl. As. Rar. II. 87, t. 199 (the fruit only); Wall. Cat. 490; Brandis For. Fl. 500. *Juglans pterococca*, Roxb Fl. Ind. III. 631 (in part only).

PERAK: *King's Collector* 162!; at Temango, *Ridley* 14494!.—  
DISTRIB. India, Burma, Malay Archipelago, Philippines.

2. *ENGELHARDTIA NUDIFLORA*, Hook. f. Ic. Pl. 1747 (1888) and Fl. Br. Ind. V. 597. A lofty tree; branchlets pale brown with conspicuous lenticels, the uppermost tawny-pubescent and glandular. *Leaves* paripinnate with 2—6 pairs of opposite or subopposite leaflets, coriaceous, 10—15 cm. long in all; leaflets subsessile, elliptic or

obovate, obtuse at apex usually with a short acute point, attenuate or cuneate more or less unequally at base; entire or subcrenate on the margins; the upper surface dark and shining when dry the lower ferruginous-brown nearly glabrous and glandular; 3—8 cm long, 2—3 cm. broad; nerves 6—10 pairs, somewhat impressed above, prominent beneath. *Flowers*: ♂ in slender axillary spikes 2—4 cm. long, bracts subpectinately lobed in minutely antheriferous lobes, anthers ellipsoid, hispidulous: ♀ in subsolitary slender axillary spikes 5—8 cm. long, erect in flower pendulous in fruit; bracts 3 fid, very glandular, the midlobe the longest; perianth-lobes 4, triangular acute, recurved in fruit; ovary orbicular, stiffly hirsute; style slender, divided into 2—4 filiform stigmas. *Fruit* a small globose nut, about 4 mm. in diam., covered with stiff aricular hairs and surmounted by the persistent perianth lobes; cupular bract much enlarged, cleft nearly to the base within and divided on the outside into three scarious spatulate lobes, the mid-lobe 3—4 cm. long and up to 1 cm. broad, the side-lobes about half as long, all three prominently net-veined and covered with glandular scales (inside is a short acute fourth lobe, sometimes absent).

PENANG: Government Hill, *Maingay* K.D. 1510!. PERAK: at Bruas Dindings, a tall slender tree with red fruit, *Ridley* 7213!. SINGAPORE: in garden jungle, *Ridley* 5905!.

var. *crenata* Hook f. M.S. in Herb. Kew. Leaflets prominently crenate, very unequal at base; fruiting bracts with the side lobes frequently winged and the small inner lobe more expanded. *E. serrata*, Hook. f. in Fl. Br. Ind. V. 596 not of Blume.

PENANG: at Muka head, 150 m. alt., *Curtis* 716!.

It would be interesting, as Sir J. D. Hooker suggested, to obtain ♂ flowers of this var.; it is not impossible that it may prove to be a distinct species. I do not think it is *E. serrata*, Bl., of which I have seen specimens in the Kew and Calcutta Herbaria.

3. *ENGELHARDTIA WALLICHIANA*, Lindl. in Wall. Cat. 4942 (1823). A tall densely foliaged tree, reaching a height of 24—30 m. of stem; branchlets slender, dark grey, smooth, the uppermost minutely tawny-puberulous. *Leaves* paripinnate with 2—4 pairs of leaflets, subopposite or alternate, coriaceous. 20—30 cm. long in all, the petiole 5—10 cm. long; leaflets petiolulate (about 1 cm.), sub-falcately lanceolate, long but obtusely acuminate at apex, narrowed and somewhat decurrent at base; margins entire, reflexed; both

surfaces smooth, glabrous, yellowish-green when fresh, olive-brown when dry; 10–16 cm. long, 3–5 cm. broad; main nerves 12–14 pairs, curved to join in loops near the margin, reticulation areolate. *Flowers* in spikes or racemes in spreading suberect panicles: ♂ spikes 5–10 cm. long; bracts minute, 3-lobed, covered with glandular scales; perianth-lobes 4, obovate, cucullate, also densely glandular without, each bearing usually 3 stamens, one at base two a little higher up, anthers minute, suborbicular, nearly sessile: ♀ in tawny-puberulous racemes reaching 20 cm. in length; pedicels 3–5 mm. long, curved upwards; bracts cup-shaped, 3 lobed; perianth-lobes 4 as in ♂, surmounting the glandular depressed-orbicular ovary; style very short, stigmas 4 spreading calucous. *Fruit* a globular nut 5–6 mm. in diam., closely covered with golden round glandular scales and surmounted by the hard-ned persistent perianth-lobes; cupular bract at first small, then gradually expanded into a 3-lobed scarious involucre cleft to the base on the inner side, the mid-lobe spatulate, 4 cm. long by 1–1.5 cm. broad, the side lobes oblong 2–2.5 cm. long by 8 mm. broad, the whole involucre prominently net-veined, with glandular scales and scurfy on the nerves. C. DC. Prodr. XVI. ii. 141; Hook. f. in Fl. Br. Ind. V. 596. *E. chrysolepis*, Hance in Ann. Sc. Nat. Sér. 4 XV. 227; Baill. Hist. Pl. XI. 403, fig. 469. *E. Roxburghiana*, Lindl. in Wall. Pl. As. Rar. II. 87 t. 199 (*in part only*, i.e. *all but the fruit*). *Juglans pterococca*, Roxb. Fl. Ind. III, 631 *in part only*.

PENANG AND SINGAPORE: *Wallich* 4942!. PENANG: Government Hill, 200 ft. *Maingay* K.D. 1599!; *Curtis* 56!; *King's Collector* 1799!; *Ridley* 9367!. PERAK: in old dense forest about Larut at 1000 m. alt., *King's Collector* 2915!; *Scortechini*!; *Wray*!.—DISTRIB. China, Tonkin.

The plate in *Wallich* Pl. As. Rar. clearly represents this species except the drawing of the fruit, which belongs to *E. spicata*. The plate is copied from *Roxburgh's* drawing of *Juglans pterococca* and the description in *Roxb. Fl. Ind.* except as regards the female flowers and fruit clearly belongs, as suggested by *Hook. f.* in the *Fl. Br. Ind.*, to this species also.

### Family CXIII. MYRICACEÆ.

Glandular and aromatic trees or shrubs. *Leaves* alternate penninerved, simple or rarely pinnatifid, entire serrate or irregularly dentate; stipules 0. *Flowers* unisexual, dioecious or rarely monoecious, in bracteate catkin-like spikes; the male spikes solitary,



fascicled or paniced, the female spikes axillary, the bracts 1—4 flowered; in monœcious species the male flowers below, the female above. *Male flowers*: stamens 3—6, rarely more, on a torus adnate to the bract; filaments short, free or connate; anthers erect, 2-celled. *Female flowers*: ovary 1-celled, sessile, with 2—4 minute bracteoles; style bifid, inwardly stigmatose; ovule 1, erect, orthotropous. *Drupe* ovoid or globose with a resinous, often papillose, succulent or waxy exocarp and hard endocarp. *Seed* erect; testa membranous, albumen 0; embryo straight, cotyledons plano-convex, radicle short, superior. Genus 1.

### 1. MYRICA, Linn.

#### *Characters of the Family.*

**DISTRIB.** Species about 63, in temperate and tropical regions, not yet reported from Australia.

1. MYRICA *ZESULENTA*, Buch.-Ham. in D. Don Prodr. Fl. Nep. 56 (1825). A small evergreen diœcious tree or large shrub, sometimes reaching 10 m. in height; branches rather stout with smooth greyish brown bark, branchlets pale, lenticellate, the uppermost brownish-pubescent. *Leaves* coriaceous, crowded towards the ends of the branchlets; oblanceolate or obovate, rounded or obtuse or obtusely acute at apex, cuneate at base; slightly pubescent beneath when young, especially on the midrib, and sparsely covered with circular resinous glands, glabrous on both surfaces when old, when dry the upper surface nearly black, the lower purplish-brown; margins entire or serrulate towards the tip, those of young shoots often prominently dentate; 4—12 cm. long, 2—4 cm. broad; midrib prominent on both surfaces; main nerves 10—15 pairs, usually nearly at right angles with the midrib, joining in loops near the margin; secondary nerves short, reticulation areolate; petiole 4—6 mm. long, tuberculous. *Flowers*: ♂ in panicles 4—5 cm. long; catkins in clusters on a pubescent rhachis and its branches, the catkins up to 3 cm. long; each catkin subtended by an ovate cordate bract about 1.5 mm long, covered with glandular scales; flowers in each catkin about 10—12, each with a small ovate cordate flowering bract and 3—6 stamens; anthers orbicular, 2-celled, filaments short: ♀ in simple spikes up to about 4 cm. long; rhachis grey-pubescent; flowers in each catkin about 3, subtended by an ovate obtuse glandular-scaly bract about 1 mm. long, each flower with a bract about 0.5 mm. long; styles long; scales at the base of the ovary 2—3, very minute.

*Fruit* an ellipsoid flattened drupe 0.5—1 cm. long, the exocarp covered with dense brown hair and red clavate fleshy papillose processes; endocarp thick, bony, rugosely pitted without. Chevalier Monog. Myric. 120 (1901), *M. sarpida*, Wall. Tent. Fl. Nep. t. 45 and Cat. 6811; C. DC. Prodr. XVI. ii. 151; Brandis For. Fl. 495. *M. integrifolia*, Roxb. Fl. Ind. III. 765 (1832); C. DC. l.c. 151; Wight Ic. tt. 764, 765; Wall. Cat. 6812. *M. missionis*, Wall. Cat. 7297; C. DC. l.c. 152. *M. Farquhariana*, Wall. Tent. l.c. 61; Cat. 6813; C. DC. l.c. 152. *M. Nagi*, Hook. f. in Fl. Br. Ind V. 597 non Thunb.; Kurz For. Fl. II. 475; Collett Fl. Siml. 475 t. 151; Brandis Ind. Trees 620.

PAHANG: at Peeken and Kwala Brawas, Ridley 1076!, 1567!. MALACCA: Griffith K.D. 5008!; Mainyay K.D. 1347; at Bukit Bruang and Bukit Kajan, Alwis!, Vern. 'Poko Golinche' and 'Poko Kusama.' SINGAPORE: Wallich 6813!; a bushy tree on the seashore at Toas, Ridley 297!; in Woodland at Kranji, Ridley 297; at Bajan, Vern. 'Kayteng' Ridley 3955.—DISTRIB. India, China, Japan.

Var. *auriculata*, Gamble. *Leaves* auricled at the base, main nerves more conspicuous beneath. *Flowers* in catkins, clustered on the rachis of a simple spike 2—4 cm. long; bracts of each catkin acuminate, reflexed, 2 mm. long, those of each flower acute, 1 mm. long.

PAHANG: at Gunong Tahan, up to 1500 m. alt., July 1905. Wray and Robinson 5519!.

#### Family CXIV. CASUARINACEÆ.

Trees or shrubs; branches woody; branchlets subherbaceous, cylindric, grooved, jointed, the internodes ending in a short whorled sheath of connate subulate scales, which represent the leaves, the branchlets having the habit of *Ephedra* or *Equisetum*. *Flowers* monœcious or dicecious: ♂ in whorls in terminal spikes of short superposed toothed cups, each flower 2-bracteolate; ♀ in ovoid or globose heads, bracteate and bracteolate. *Perianth*: ♂ of 1 or 2 concave segments, circumscissile at the base and pushed off by the anther eventually: ♀ none. *Stamen* 1, inflexed in bud; anther large, the cells distinct placed back to back but free above and below, dehiscing longitudinally. *Ovary* minute, 1-celled; style short, then bifid with long filiform red arms stigmatose to the base; ovules 2, collateral, semi-anatropous. *Fruit* an oblong or cylindric cone

formed of the enlarged hardened bracts and bracteoles, which together make 2-valved cavities enclosing the achenes; achenes compressed, thin above and with many spiral vessels, crustaceous below, winged terminally and tipped by the style. *Seed* by abortion solitary, laterally attached; testa membranous; albumen 0; cotyledons flat, equal, fleshy: radicle superior.—DISTRIB. 1 genus.

### 1. CASUARINA, Forst.

#### *Characters of the Family.*

DISTRIB. About 23 species, chiefly Australian, a few only Malayan and Pacific, one extending to the E. Coast of the Bay of Bengal.

1. CASUARINA EQUISETIFOLIA, Forst. Char. Gen. 103, t. 53 (1776). A very tall tree with drooping branches, the younger ones covered with the recurved remains of the scales; branchlets filiform, internodes about 4—6 mm. long, sheaths with 6—8 scales (leaves) usually 8. *Flowers* monœcious: ♂ spikes cylindric or elongate-clavate, 1.5—2 cm. long, flowers in whorls of usually 8; bracteoles lanceolate-penicillate; perianth lobes unequal, hooded: ♀ in subglobose heads about 5 mm. long, bracteoles minute. *Fruit* cones globular-oblong about 1 cm. in diam., with about 12 rows of achenes in puberulous hardened bracts. Miq. Fl. Ind. Bat I.; 875 and in DC. Prodr. XVI. ii. 338; Brandis For. Fl. 435 and Ind. Trees, 620; Kurz For. Fl. II. 494; Benth. & Von Mueller Fl. Austral. VI. 197; Hook. f. Fl. Br. Ind. V. 538; Engl. & Prantl Naturl. Pflanzenfam. III. i. 17, Fig. 15 A—L; Koord. & Val. Bijdr. X. 272; Koord. Exkurs. Fl. Jav. II. 7; Prain Beng. Plants 985. *C. muricata*, Roxb. Fl. Ind. III. 519; Wall. Cat. 6815. *C. littorea*, Rumph. Herb. Amb. III. 86, t. 57.

PAHANG: at Pekan and Sungei Meang, Ridley!.—DISTRIB. Coast of the Bay of Bengal, from Chittagong southwards; coast of the China sea; Malay Archipelago, Pacific Islands, Australia, elsewhere frequently cultivated in most tropical regions.

### Family CXV. FAGACEÆ.

Trees or rarely shrubs. *Leaves* simple, alternate, penninerved, entire toothed or lobed; stipules free, caducous. *Flowers* minute, usually monœcious, occasionally dioecious, sometimes hermaphrodite; males in erect or pendulous catkins or spikes or rarely

cymosely capitate; females in spikes or capitate or solitary; bracts sometimes involucrate. *Perianth*: ♂ usually 6- occasionally 4-7-lobed, membranous, the lobes free or connate: ♀ usually as in ♂ but smaller, free or adnate to the ovary, usually with an involucre and many imbricate scales. *Stamens* usually 6 or 12, sometimes fewer, occasionally more, adnate to the base of the perianth, filaments slender, anthers dehiscent longitudinally. *Ovary* in ♂ flowers reduced to a rudimentary pistillode or 0: in ♀ more or less completely 3-6-celled, the cells 2-ovuled; ovules pendulous anatropous; styles as many as the cells; stigmas terminal, often minute. *Fruit* a nut, sometimes 1-4 nuts, included within or surrounded by often greatly enlarged involucrate bracts forming a cupule; pericarp coriaceous or woody. *Seed* pendulous, usually solitary; testa membranous; albumen 0; cotyledons thick, fleshy, plano-convex or sinuate, sometimes indented in star-like fashion, sometimes ruminate; radicle superior.—*DISTRIB.*: Genera 5, chiefly of north temperate regions or of hilly districts in the tropics.

Nut (acorn) 1 only; cupules cup-shaped or saucer-shaped or completely enclosing the acorn.

Male spikes pendulous; stamens usually 6; stigmas broad, covering the inner surface of the summit of the recurved styles or capitate on them; cupule (in Malay Peninsular species) lamellate, surrounding the lower part of the acorn only; leaves usually serrate or lobed .. ..

1. *QUERCUS*.

Male spikes erect; stamens usually 12; stigmas consisting of a pore, terminal on the slightly curved style; cupule of imbricate scales or lamellate or entirely enclosing the acorn, sometimes smooth, occasionally spiny; leaves usually entire, rarely serrate .. ..

2. *PASANIA*.

Nuts 1 or up to 4; cupules enclosing the nuts, often splitting irregularly, usually armed with spines or clusters of spines or sometimes tubercular only; stigmas as in *Pasania*; leaves entire or serrate .. ..

3. *CASTANOPSIS*.

It will be seen that I have preferred, with a slight modification, to adopt the genera proposed by Prantl in Engler's 'Natürlichen Pflanzenfamilien' and to subdivide the old genus *Quercus* under which the Malay Peninsular Oaks were described by Sir G. King in his Monograph and by Sir J. D. Hooker in the Flora of British India into the two very well marked genera *Quercus* and *Pasania*, rather than to follow the more detailed subdivision preferred by Oers. ed in 1866 or by Schottky in 1912. The genus *Castanopsis*, at any rate so far as the species with one nut in the cupule is concerned, comes very near to *Pasania*, especially to those species which have prickly cupules.

## 1. QUERCUS, L.

Trees or shrubs, deciduous or evergreen. *Leaves* toothed or lobed, rarely entire. *Flowers* monœcious: ♂ solitary or 1—3 together, in pendulous catkins; ♀ solitary in erect few-flowered spikes. *Perianth*: ♂ cup-shaped, thin, with usually 6 sometimes 3—5 lobes supported by small bracteoles: ♀ as in ♂, but smaller, free or adnate to the ovary, surrounded by an involucre of many imbricate or annular scales. *Stamens* usually 6, sometimes fewer; filaments slender; anthers rather large. *Ovary*: in ♂ flowers 0 or reduced to a villous pistillode; in ♀ flowers 3-celled, the cells 2-ovulate; styles usually 3, short, recurved; stigmas broad, lining the inner faces of the styles. *Acorn* ovoid globose or turbinate, seated on or partly enclosed in a cup-shaped or saucer-shaped cupule, the involucreal scales hardened into teeth or tubercles or annular lamellæ; pericarp crustaceous or coriaceous; surmounted by an umbo consisting of the persistent styles. *Seed* 1; testa membranous; cotyledons fleshy. plano-convex.—*DISTRIB.* Temperate regions of the Northern Hemisphere, a few only extending down into the mountains of Malaya, about 200 species (Prantl).

According to Prantl in Engler and Prantl's 'Natürlichen Pflanzenfamilien' the genus is divisible into 3 Sections, all the species of the Malay Peninsula and Islands belonging to the Section CYCLOBALANOPSIS in which the involucreal bracts forming the cupule are united to form concentric lamellæ with entire crenate or denticulate margins, and the leaves are dentate or serrate.

Leaves with silvery scales on the lower surface, serratures near the apex obscure and shallow; acorn-cupules obconic at base, then hemispheric, with 8—10 minutely denticulate lamellæ, 2 cm. deep .. 1. *Q. argentata*.

Leaves glabrous on the lower surface, serratures near the apex prominent.

Leaves 10—18 cm. long; cupule cylindric-hemispheric, 2—2.5 cm. in height and depth, the lamellæ thin tomentose .. .. 2. *Q. oideocarpa*.

Leaves 5—7 cm. long; cupule slightly obconic below then cylindric, 1—5 cm. in height and diam., 2 of the lower belts much thickened, the rest thin .. .. 3. *Q. turbinata*,  
var. *crassilamellata*.

1. QUERCUS ARGENTATA, Korth. in Verh. Nat. Gesch. Bot. 215, t. 47, fig 1—17 (1839—42). A tree; branchlets stout, rough, very prominently lenticellate. *Leaves* coriaceous; elliptic-oblong, oblong-lanceolate or oblanceolate, abruptly and somewhat obtusely

caudate-acuminate at apex, acute or acuminate at base; margin entire or the upper third very obscurely repand-serrate with 4—5 teeth; upper surface shining, glabrous, olive-brown when dry, lower dull with a layer of minute silvery scales; 10—20 cm. long, 4—8 cm. broad; midrib slender, prominently impressed above and raised beneath; main nerves 10—15 pairs, regular, rather indistinct, curved to near the margin and then joining in small loops; transverse nervules very many, subparallel, faint like the reticulation; petiole slender, 1.5—3 cm. long, grooved. *Spikes*: ♂ in axillary or lateral panicles up to 3 cm. long; rhachis of panicle angled, subglabrous, of spikes tawny villous; bracts of spikes linear-subulate, 3 mm. long; bracteoles ovate-acute, 1.5 mm. long: ♀ lateral, 2—5 cm. long, stout; rhachis densely lenticellate and rough. *Flowers* in each cluster 3; perianth cup-shaped, obscurely 3-lobed; stamens 4—6. *Fruit* sessile; mature cupule obconic at base then hemispheric, embracing about half the acorn, 2.5 cm. in diam., 2 cm. deep; lamellæ about 8—10, thin, broad, subequal, grey-puberulous, minutely denticulate; acorn ovoid, chestnut-brown, smooth, shining, 3 cm. long, 2 cm. in diam., the umbo truncate-conic. Blume Mus. Bot. Lugd.-Bat. I. 299; A. DC. in Prodr. XVI. ii. 91; Miq. Fl. Ind. Bat. I. 858; Ann. Mus. Lugd.-Bat. I. 115; Wenzig in Jahrb. Bot. Gart. Berl. IV. 230. King Ann. Calc. II. 30, t. 24 A. *Cyclobalanopsis argentata*, Oerst; in Kjoeb. Vidensk. Meddel. 79 t. I. II. 5 to 8 (1866).

MALACCA: at Batu Tiga, Vern. 'Pinang Pinang' Holmberg 770!. SINGAPORE: in garden jungle, Ridley 6443!.—DISTRIB. Sumatra Korthals, Forbes 2719, 2753; Bangka Teysmann; Borneo Hallier 2864! (♂ flowers).

The description of the ♂ flowers (unfortunately still in bud-stage) is taken from Hallier's specimen, that of the fruit from a ripe acorn collected by Ridley, as the fruits described by King and his predecessors were admittedly immature.

2. *QUERCUS OIDOCARPA*, Korth. in Verh. Nat. Gesch. Bot. 216, t. 47. fig. 18 (1839—42). A large tree reaching 30 m. in height and 60—90 cm. in diam. of stem; branchlets brown, stout, with many prominent lenticels, the uppermost puberulous; buds ovoid, small, pubescent. *Leaves* coriaceous; elliptic-oblong or oblanceolate, acuminate at apex, acute or acuminate and sometimes unequal at base; upper surface glossy green when fresh, reddish-brown and shining when dry, lower dull, smooth, glabrous; margin entire below, prominently serrate in the upper fourth part with about 2—4 incurved fairly deep serratures; 10—18 cm. long, 3.5—6 cm. broad;



midrib stout, raised on both surfaces; main nerves 8—12 pairs slightly prominent on the upper, more so on the lower surface, curved to close to the margin; transverse nervules prominent, subparallel, enclosing the prominent reticulation; petiole 2—3 cm. long, slender. *Spikes*: ♂ unknown: ♀ solitary, shorter than the leaves, flexuous, stout especially in fruit. *Fruit* sessile; cupule cylindric-hemispheric embracing one half to three-fourths or even more of the acorn, 2—2.5 cm. in diam. and depth; lamellæ 6—8, broad, thin, minutely tomentose, the margins of the lower boldly crenate, of the upper subentire; acorn ovoid-globose, with a slightly flattened top and conical zoned umbo minutely tomentose, 2—3 cm. long, 2—2.5 cm. in diam. Blume Mus. Bot. Lugd.-Bat. I 302; A. DC. in Prodr. XVI. ii. 99; Miq. Fl. Ind. Bat. I; 856 and Ann. Mus. Lugd.-Bat. I. 115; Wenzig in Jahrb. Bot. Gart. Berl. IV. 233; King in Ann. Calc. II. 28 t. 21A; Hook. f. Fl. Br. Ind. V. 603. *Cyclobalanopsis oidocarpa*, Oerst. in Kjoeb. Vidensk. Meddel. 78 (1866).

PENANG: at Batu Feringi, Vern. 'Brangen Babie', *Curtis* 434!. PERAK: in dense forest up to 250 m. alt., Larut, *King's Collector* 3723! 8258!; *Scortechini* (acorn only). DISTRIB: Sumatra *Korthals*, *Forbes* 585!; Borneo. Vern. 'Berangan Antan' *Ridley*.

3. *QUERCUS TURBINATA*, Blume Bijdr. 523 (1825), Fl. Jav. Cupul. 31, t. 18 and Mus. Bot.-Lugd.-Bat. I. 302; Miq. Fl. Ind. Bat. I. i, 855 and Ann. Mus. Lugd.-Bat. I. 114 (excl. syn. *Q. Horsfieldii*, Miq.); Koord. & Val. Bijdr. X. 22; Koord.-Exkurs. Fl. Jav. II. 60, fig. 10. *Q. lineata*, Bl. var. *Merkusii*, Wenzig in Jahrb. Bot. Gart. Berl. IV. 232 (excl. syn. *Q. Horsfieldii*; Miq.); King Ann. Calc. II. 33, t. 26. 2. *Q. Merkusii*, Endl. Gen. Pl. Suppl. IV. ii. 28. *Cyclobalanopsis Merkusii*, Oerst. in Kjoeb. Vidensk. Meddel. 79 (1866). *C. turbinata*, Schky in Engl. Bot. Jahrb. XLVII. 648 (1912).

Var. *crassilamellata*, Gamble. A large tree; branchlets stout, dark grey, rough. *Leaves* coriaceous; elliptic-oblong, shortly and obtusely acuminate at apex, attenuate at base; margins serrate; in the upper third or fourth part with about 4—5 pairs of serratures; glabrous or slightly puberulous on the lower surface, shining on the upper, dull on the lower surface and reddish-brown and slightly glaucescent when dry; 5—7 cm. long, 1.5—3 cm. broad; midrib moderately stout, slightly grooved on the upper, raised on the lower surface; main nerves 8—9 pairs, regular, subparallel, raised on both

surfaces; transverse nervules many, irregular and branched, reticulation obscure; petiole slender, 6—12 mm. long. *Spikes*: ♂ in dense short catkins, 1—2 cm. long, clustered in upper leaf-axils, densely villous: ♀ under 3 cm. long, very stout in fruit. *Flowers*: ♂ perianth 6-lobed, the lobes very small and thin, densely villous; stamens 6, anthers large, reniform, the connective penicillate; ♀ unknown. *Fruit* sessile, when very young truncate-obconic, the orifice showing only a short umbo tipped with the 3 divaricate styles; when nearly mature cupule slightly obconic at base for 5 mm. with about 2 belts, then cylindric for 1—1.5 cm. with about 4 belts, then flat with 2—3 belts, leaving an orifice 5—10 mm. in diam. from which only the umbo of the ovoid depressed shining slightly puberulous acorn protrudes, the acorn being 1 cm. in diam. and 7 mm. in height; the second and third lowest belts much thickened, corky, crenately-lobed, the upper belts entire.

PENANG: West Hill at about 750 m. alt., *Curtis* 903! PERAK: camp on Ulu Batang Padang, 1500 m. alt., *Wray* 1532!

This may prove to be a new species when better material becomes available, but in leaves and also in the acorns, except the two conspicuously thickened belts, it agrees well with Teysmann's specimens of *Q. Merkusii*, Endl., from Bangka Island. I quite agree with Koorders and Valetton that *Q. turbinata*, Bl., is distinct from *Q. lineata*, Bl. The description of the ♂ inflorescence and flower is taken from *Curtis* 903 which seems to, but does not certainly, belong to the same plant as *Wray's* fruiting specimen. The leaves, however, agree quite well and the species belongs clearly to this genus.

## 2. PASANIA, Oerst.

Trees usually evergreen. *Leaves* usually entire, rarely serrate. *Flowers* monœcious or sometimes diœcious, often androgynous, in erect spikes, when androgynous the ♀ in the lower part the ♂ above, sometimes a few ♀ between, solitary or in clusters of 3 or more in ♂, of 3 at most in ♀, the clusters supported by minute bracteoles. *Perianth* cup-shaped, with usually 6, occasionally more lobes: ♂ larger than ♀, the latter surrounded by an involucre of many imbricate or annular scales. *Stamens* usually 12, rarely fewer or more; filaments very slender, erect; anthers very small, reniform or globose. *Ovary* in ♂ flowers a conspicuous villous pistillode; in ♀ flowers 3-celled, the cells 2-ovulate; styles 3, cylindric-subulate, spreading; stigma a terminal pore. *Acorn* ovoid globose or turbinate, seated on or enclosed except the umbo in a cupule; cupule with the scales imbricate or combined in lamellæ or reduced

to mere lines, sometimes tubercular or spinous; pericarp crustaceous coriaceous or woody, surmounted by an umbo consisting of the persistent styles, adherent to the cupule at the base or sometimes entirely. *Seed* 1, testa membranous, cotyledons fleshy, plano-convex or sinuous, sometimes indented star-like by protuberances of the endocarp.—*DISTRIB.* Chiefly of the Malay Peninsula and Archipelago and the Pacific Islands, about 100 species (Prantl).

Cupules with imbricate scales, their apices free, acorns much exsert (Sect. I. *EUPASANTIA*).

Mature cupules shaggy with rather long (to 5 mm.) soft spreading scales.

Cupules thin, enclosing most of the acorn; acorn densely silky; leaves membranous, oblong-lanceolate or -oblanceolate, caudate-acuminate, 10—25 cm. long, pubescent on midrib and nerves .. ..

1. *P. lappacea*.

Cupules thick, large, enclosing about two-thirds of the acorn; acorn large, tawny-velvety; leaves very coriaceous, ovate, obtusely acute, 6—12 cm. long, glabrous ..

2. *P. Kingiana*.

Cupules saucer-shaped, the margins incurved, enclosing only the base of the acorn; acorn cylindro-globular, depressed, 2.5 cm. in diam.; leaves coriaceous, oblong or elliptic, obtuse or acute, 10—20 cm. long, glabrous..

3. *P. Scortechinii*.

Mature cupules with more or less adpressed, small, imbricate, acute or apiculate scales.

Cupules hemispheric, 12 mm. in diam.; acorns narrowly cylindric-conic, 2.5 cm. long, prominently umbonate; leaves thinly coriaceous, more or less oblong, acute, glabrescent except on the midrib and nerves ..

4. *P. Kunstleri*.

Cupules saucer-shaped, the scales imbricate.

Scales not at all arranged in rings; acorns glabrous, in conspicuous close spikes; leaves coriaceous.

Acorns ovoid-conic to depressed-globose; leaves variable, rather large, acuminate, 10—30 cm. long by 4—10 cm. broad, glabrous ..

5. *P. spicata*.

Acorns globose-conic; leaves elliptic-oblong, caudate-acuminate, very large, 20—40 cm. long by 6—18 cm. broad, glabrous ..

6. *P. grandifrons*.

Acorns ovoid-cylindric; leaves oblong, cuspidate-acuminate, 20

- 45 cm. long by 5—8 c.m. broad,  
glabrous except midrib and nerves;  
perulate scales conspicuous. .. 7. *P. Falconeri*.
- Scales more or less arranged in obscure  
rings but distinct and apiculate; acorns  
ovoid-conic.
- Acorns velvety; cupule-scales ad-  
pressed, but their apices not spread-  
ing or reflexed.
- Leaves elliptic, subcoriaceous,  
shortly caudate-acuminate,  
7—15 cm. long, main nerves  
9—10 pairs not prominent .. 8 *P. Lamponga*.
- Leaves oblong-lanceolate or  
-oblanceolate, coriaceous, cau-  
date-acuminate, 12—20 cm.  
long; main nerves 8—14 pairs,  
prominent .. .. 9. *P. Wallichiana*.
- Acorns glabrous; cupule-scales ap-  
pressed, but their apices spreading  
or reflexed.
- Leaves thinly coriaceous, elliptic,  
acute, pubescent at first, then  
glabrous .. .. 10. *P. sundaica*.
- Leaves coriaceous, elliptic-ob-  
long, cuspidate, densely to-  
mentose .. .. 11. *P. Hystrix*.
- Cupules flat, only applied to base of acorn;  
cupule-scales appressed with minute apices;  
acorn ovoid, puberulous; leaves thinly cori-  
aceous, elliptic, long caudate-acuminate, .. 12. *P. Curtisii*.
- Cupules with the scales united in concentric entire or  
denticulate lamellae; acorns much exsert (Sect II.
- CYCLOBALANUS).**
- Cupules solitary or in pairs or threes, usually one  
only developed.
- Acorn conspicuously longer than broad, ov-  
oid-conical; cupule saucer-shaped, under  
2.5 cm. in diam., the lamellae denticulate;  
leaves obtusely caudate-acuminate.
- Acorn glabrous or silky-pubescent, sharp-  
ly conical, usually 1.5 cm. high;  
leaves coriaceous, usually elliptic-lan-  
ceolate, stellate-tomentose beneath. .. 13. *P. conocarpa*.
- Acorn densely grey-sericeous-pubescent,  
obtusely conical, usually 2 cm. high;  
leaves chartaceous, elliptic-ovate, sil-  
very-lepidote beneath .. .. 14. *P. Ewyckii* var. *lati-  
folia*.

Acorn not conspicuously longer than broad, hemispheric; cupule cup-shaped or saucer-shaped, under 2 cm. in diam., the lamellae hardly denticulate.

Cupule very thin saucer-shaped, the lamellae rather indistinct.

Acorn more or less ovoid, under 2 cm. in diam., glabrous; leaves thinly coriaceous, lanceolate, acute at base, silvery-lepidote beneath

14. *P. Ewyckii.*

Acorn broadly hemispheric, under 2.5 cm. in diam., glabrous; leaves chartaceous, elliptic, rounded at base, minutely stellate-pubescent beneath. . . . .

15. *P. cyrtorhyncha.*

Cupule moderately thick; leaves coriaceous.

Lamellae not very prominent, obscurely denticulate.

Acorn ovoid-conic, glabrous; leaves broadly elliptic, 7—12 cm. long, glabrous . . . . .

16. *P. Bennettii.*

Acorn depressed-hemispheric; leaves oblong-lanceolate or oblanceolate, 10—25 cm. long, lepidote-puberulous . . . . .

17. *P. Cantleyana.*

Lamellae prominent and thickened.

Acorn depressed-globose, over 2 cm. in diam.; leaves elliptic, 8—15 cm. long . . . . .

18. *P. Wenzigiana.*

Acorn ovoid-conic, scarcely 1.5 cm. in diam.; leaves lanceolate, 6—9 cm. long . . . . .

19. *P. Rassa.*

Acorn turbinate or depressed-hemispheric, conspicuously broader than long.

Cupule thin, its edges spread out free from the acorn; lamellae broad and flat; acorn sparsely sericeous, 3 cm. in diam.; leaves oblong, thinly coriaceous, minutely white-puberulous beneath, nerves very oblique, 15—30 cm. long . . . . .

20. *P. Eichleri.*

Cupule thick, its edges incurved and appressed to the acorn, lamellae more or less thickened.

Acorn under 2.5 cm. in diam.; leaves thinly coriaceous.

Lamellae few, about 5, broad; leaves oblong-lanceolate or

oblanceolate, long caudate-acuminate, 15—20 cm. long, 4—6 cm. broad .. 21. *P. Clementiana*.

Lamellæ many, about 8—10, the lower ones broad; leaves elliptic-oblong or oblanceolate, shortly obtusely acuminate, 5—13 cm. long, 2—4 cm. broad .. 22 *P. Omalokos*.

Acorn 3—4 cm. in diam.; leaves very coriaceous.

Lamellæ 8—13, thick and prominently annulate; acorn glabrous, hardly depressed; leaves oblanceolate, obtuse or emarginate, cuneate, 8—20 cm. long, glabrous beneath... 23. *P. lucida*.

Lamellæ about 10, rounded, indistinct and irregular, wavy; acorn tomentose, much depressed; leaves oblong, acuminate at apex and base, 15—30 cm. long, minutely tomentose beneath .. 24. *P. cyclophora*.

Lamellæ about 5, acute, more or less oblique; acorn very large, glabrous, much depressed; leaves elliptic-oblong or lanceolate, caudate-acuminate, 10—20 cm. long, glaucescent beneath .. 25. *P. costata*.

Cupules combined usually in threes, sometimes less, sometimes more, together, apparently several developed; leaves large, lanceolate, very coriaceous... .. 26. *P. lumpadaria*.

Cupules enveloping the whole acorn except the umbo, but not adnate to it except at base; with scales or tubercles or spines or merely ringed (Sect. III. CHLAMYDOBALANUS).

Cupules with appressed scales; leaves coriaceous, entire, more or less elliptic; acorns velvety.

Cupules always thin; acorns depressed-turbinate; main nerves of leaves 12—14 pairs .. 27. *P. Blumeana*.

Cupules thin when half ripe, thick tubercled when mature; acorns globose; main nerves 6—8 pairs .. 28. *P. confragosa*.

Cupules with spreading spines; leaves more or less lanceolate; acorns pubescent or silky.



- Cupules depressed, completely covered with rather soft spines which are hooked at the apex; leaves subcoriaceous, entire .. 29. *P. Wrayii*.
- Cupules more or less conical with numerous tufts or broken lines of sharp spines; leaves coriaceous, entire; ♂ spikes fairly stout, perianth-lobes nearly free .. 30. *P. discocarpa*.
- Cupules obliquely ovoid with oblique rings of sharp spines; leaves coriaceous, entire or serrate in the upper half; ♂ spikes almost filiform, perianth-lobes free .. 31. *P. acuminatissima*.
- Cupules smooth, with few faint rings or none.
- Cupules with faint rings, and obscure vertical lines between; leaves chartaceous, elliptic; fruit pedicels very thick .. 32. *P. encleisacarpa*.
- Cupules without rings but with vertical ribs; leaves coriaceous, lanceolate; fruits sessile 33. *P. Robinsonii*.
- Cupules enveloping the acorn except the umbo and adhering to it for some distance above the base; ringed or tubercled concentrically or obliquely (Sect. IV. LITHOCARPUS).
- Fruits pyriform; flattened and umbonate at top; cupule obscurely lamellate, completely enclosing the sericeous thin top of the pericarp; acorn separable only at the top; leaves coriaceous, oblong 34. *P. Maingayii*.
- Fruits ovoid or obovoid, narrowed towards the apex; cupule with 5—7 slightly prominent lamellae; leaves subcoriaceous, lanceolate .. 35 *P. Beccariana*.

1. PASANIA LAPPAGEA, Oerst. in Kjoeb. Vidensk. Meddel. 84 (1866). A tree with spreading branches reaching 18—24 m. in height and about 60 cm. in diam. of stem; branchlets fairly stout, greyish, sparsely tomentose, young ones, young leaves and inflorescence thickly and villously fuscous-tomentose. *Leaves* membranous; oblong-lanceolate or -oblanceolate, caudate-acuminate at apex, acutely attenuate sometimes unequally at base; margins entire; upper surface puberulous when young, afterwards glabrescent except the midrib and nerves, lower pubescent especially on the midrib and nerves; 10—25 cm. long, 4—8 cm. broad; midrib prominent, raised on both surfaces; main nerves 12—16 pairs, nearly parallel, usually impressed above, at first straight, then curved close to the margin to run parallel with it; transverse nervules many, subparallel, enclosing an areolate reticulation; petiole rather stout, pubescent, 5—7 mm. long. *Spikes* simple, solitary, axillary, slender, up to 20 cm. long, tawny-villous; ♂ most frequent and longest, and lowest, upper ones usually ♀, some partly ♂ partly

♀. *Flowers*: ♂ chiefly in clusters or sometimes solitary, bract 1 to each cluster; perianth 5—6-lobed, the lobes thin ovate, villous without glabrous within, 1—1.5 mm. long; stamens 9—12, with long slender filaments; pistillode villous: ♀ single or in clusters of 2—3, unibracteate; cup densely clothed with scales having long points that enlarge into soft spines; perianth lobes short, inconspicuous; styles 3, cylindric. *Fruits* clustered or solitary in spikes up to 15 cm. long; cupule velvety, sessile, flattened at base, ovoid above, 2—2.5 cm. in diam., 1—1.5 cm. in height, embracing nearly the whole acorn when young and one-half or more when ripe, covered with distant soft curved spines about 4 mm. long these spines being the free apices of the closely adherent scales; acorn ovoid-conic, about 2 cm. high, softly and densely silky, crowned by an umbo formed of the persistent styles. Schky in Engl. Bot. Jahrb. XLVII. 675. *Quercus lappacea*, Roxb. Fl. Ind. III. 637 (1832); Wight Ic. t. 220; Wall. Cat. 2780; A. DC. in Prodr. XVI. ii. 87; Kurz For. Fl. II. 484; Wenzig in Jahrb. Bot. Gart. Berl. IV. 223; Hook. f. Fl. Br. Ind. V. 607; King Ann. Calc. II. 41, t. 33; Brandis Ind. Trees 629. *Q. hirsuta*, Lindl. in Wall. Cat. 3734. *Q. Mackiana*, Hook. Ic. Pl. t. 224.

**PURAK**: in open forest near water at 90—120 m. alt. *King's Collector* 3919!; *Scortechini*!.—**DISTRIB.** India (Khasia Hills and Sylhet), Burma.

As pointed out by King the acorn-cups in Malay specimens more fully enclose the acorns than do those of Indian and Burmese specimens.

2. **PASANIA KINGIANA**, Gamble in Kew Bull. 177 (1914). A tree; branchlets stout, short, knotty, the bark dark brown, scaly, sparsely lenticellate; bud-scales short, ovate, obtuse, puberulous. *Leaves* very coriaceous, glabrous; ovate, obtusely acute at apex, rounded at base and then decurrent on the petiole; dark green when fresh, olive-brown when dry, the upper surface shining; margin recurved; 6—12 cm. long, 3—6 cm. broad; midrib stout, slightly raised and channelled near the base on the upper surface, prominent on the lower; main nerves 6—8 pairs, starting along the midrib at first then curved to the margin where they fade in diminishing loops; transverse nervules irregular, enclosing the prominently areolate reticulation; petiole stout, about 4 mm. long. *Spikes* 10—20 cm. long with stout angular puberulous rachises, ♂ ♀ and androgynous mixed, the ♀ usually uppermost, axillary to the uppermost leaves. *Flowers* solitary, in androgynous spikes, the ♀

lowest, passing into a few ♀ then into ♂ only, all with lanceolate bracteoles 2 mm. long and cushions of imbricating tawny-pubescent triangular scales; perianth of ♂ cup-shaped, 2 mm. long, very villous, lobes 6, ovate-acute, 1 mm. long, that of ♀ similar but smaller; stamens 12 or less, filaments slender, short in ♀ flowers, anthers ovate; pistillode in ♂ villous; styles in ♀ cylindric, 2.5 mm. long, conspicuous. *Fruits* when young having cupules covered with spreading scales about 3 mm. long and minutely puberulous; when mature the cupules cup-shaped on a stout scaly pedicel 6 mm. long, 2—2.5 cm. long, the lips recurved, 2.5—3 cm. in diam. embracing about two-thirds of the acorn; scales near the base large, ovate, cuspidate-acuminate, spreading, often 5 mm. long, near the mouth the scales are smaller by degrees; acorn ovoid-globose from a flattened base, tawny-velvety, 2—2.7 cm. in diam., 1.5—2 cm. high; umbo thick.

PERAK: at Gunong Bubu, Larut, 1350 m. alt., *Wray* 3910!, at Gunong Inas. 1500 m. alt., *Wray* 4155!. PAHANG: at Gunong Brumbez, 2100 m. alt., *Wray* 1586!.

3. PASANIA SCORTECHINII, Schky in Engl. Bot. Jahrb. XLVII. 676 (1912). A large tree reaching 18—30 m. in height and 90 cm. in diam. of stem; branchlets stout, purplish-black, sparsely lenticellate. *Leaves* coriaceous; oblong or elliptic, obtuse or subacute at apex, cuneate at base; margins entire, reflexed; both surfaces glabrous, glossy green with a bluish tinge when fresh, reddish brown when dry, upper shining; 10—20 cm. long, 4—5 cm. broad; midrib slender, raised on both surfaces; main nerves 8—10 pairs, raised beneath, curving to and along the margin; transverse nervules few, irregular; reticulation areolate, obscure; petiole stout, wrinkled, 9—12 cm. long. *Spikes* in fruit erect, solitary, subterminal, very stout, about 10 cm. long. *Flowers* not known. *Fruit* very large, sessile; cupule woody, saucer-shaped, the margin incurved, 3 cm. in diam. 1 cm. high, covered thickly externally with soft conical pubescent scales, embracing only the base of the acorn; acorn cylindro-globular, shining, chestnut-brown, truncate at base, slightly depressed at top and crowned by an umbo formed of the persistent style 2.5 cm. in height and diam. *Quercus Scortechinii*, King in Hook. f. Fl. Br. Ind. V. 608 (1888) and Ann. Calc. II. 43, t. 35 A.

PERAK: in open forest on a hillside at about 1000 m. alt., Larut, *King's Collector* 2188!.

4. *PASANIA KUNSTLERI*, Gamble. A tree with spreading head and pendulous branches reaching 12—15 m. in height and about 60 cm. in diam. of stem; branchlets dark brown, smooth, the young ones paler and minutely tomentose. *Leaves* thinly coriaceous; elliptic- or oblanceolate-oblong, acute or shortly and often obtusely acute at apex, rounded or cordate at base; margins entire, reflexed; both surfaces minutely pubescent when young, glabrescent when old except on the midrib and nerves, which, especially the former, are puberulous on both sides, brown or reddish-brown when dry; 10—23 cm. long, 4—8 cm. broad; midrib moderately stout, keeled on the upper surface, prominent on the lower; main nerves 8—12 pairs, at first straight, sharply curved near the margin to join in loops, those of the upper half most prominently so, impressed above, prominent beneath; transverse nervules distant, rather obscure as is the areolate reticulation; petiole none or very short, under 5 mm. long, thick, pubescent. *Spikes* axillary and solitary or terminal, and in fascicles of 3—4, some ♂ only, some ♀, some occasionally both ♂ and ♀, 10—30 cm. long; rhachis slender, ridged, tawny pubescent. *Flowers*: ♂ solitary, many- (about 5-) bracteolate; perianth of 5—6 erect tomentose oblong acute lobes 1.5 mm. long; stamens 8—12, 3—5 mm. long with long filaments and minute globose anthers; pistillode thick, villous: ♀ (some ♂) also solitary, bracteolate; cup scaly, crowned by the 6-lobed erect perianth, shorter than in the ♂ and enclosing the thick pubescent style with 3 prominent diverging branches. *Fruit* solitary in long spikes; cupules subsessile, shallowly hemispheric, 12 mm. in diam., 7 mm. deep when young, embracing more than half the acorn, when old only the lower fifth; the scales broadly ovate, acute, keeled, closely appressed, fulvous-tomentose; acorn narrowly cylindric-conic, glabrous, up to 2.5 cm. long and 1.5 cm. in diam., crowned with a conspicuous umbo contracted below the persistent perianth and the remains of the style. *Quercus Kunstleri*, King in Hook f. Fl. Br. Ind. V. 606 (1888) and in Ann. Calc. II. 40, t. 31.

PERAK: in various places from sea level to about 300 m. alt., *King's Collector* 2482!, 2621!, 2742!, 2953!, 3054!, 3608!, 5128!, 5144!, 5358!, 5406!, 5436! 5556!, 5655!, 5699!, 7571!; *Wray* 3138!; at Larut, *Scortechini* 1567!. SELANGOR: at Kwala Lumpur, *Ridley* 5110!.

5. *PASANIA SPICATA*, Oerst. in Kjoeb. Vidensk. Meddel. 83 (1866). A large tree reaching 18—24 m. in height and 50—75 cm.

in diam. of stem; branchlets stout with dark grey or blackish bark, the lenticels conspicuous and usually in vertical lines, young shoots sometimes puberulous. *Leaves* coriaceous, shining, glabrous; elliptic-oblong or lanceolate or oblanceolate or obovate, sometimes panduriform, acuminate often obtusely at apex, the acumen usually curved sideways, attenuate at base, sometimes rounded or subauriculate; 10—30 cm. long, 4—10 cm. broad; midrib stout, prominent on both surfaces; main nerves 10—20 pairs, slender, subparallel, raised on both surfaces, arched near the margin; transverse nervules indistinct and irregular, enclosing the areolate reticulation; petiole short or long, 0.5—2.5 cm. long, flattened. *Spikes* erect, in terminal panicles or fascicles, usually dicecious, occasionally the ♂ spikes bearing a few ♀; often reaching 25—30 cm. long, minutely grey-tomentose. *Flowers*: ♂ in sessile clusters, crowded above, separate below, supported by an ovate acuminate or subulate bract 1—3 mm. long; sometimes bracteolate; perianth-lobes usually 6, very short, obtuse, villous without, glabrous within; stamens 10—12 with slender glabrous filaments and small ovate anthers; pistillode large, villous, often oblong, flattened at top: ♀ in clusters of 3—5 or distinct; perianth 6-lobed; styles very small. *Fruits* when ripe densely crowded on a stout erect woody rhachis, reaching 20 or more cm. in length, single or in clusters of 3—5; when single, bearing usually the abortive cupules at the base of the fertile one; cupule saucer-shaped, embracing at most the lower third of the acorn and sometimes less, the margin acute, the scales broadly ovate-apiculate, appressed, imbricate, pubescent when young, glabrous when old; acorn ovoid-conic to depressed-globose, smooth when ripe, the umbo very small. Schky. in Engl. Bot. Jahrb. XLVII. 664. *Quercus spicata*, Smith in Rees Enac. XXIX. 12; G. Don Prodr. Fl. Nep. 56; Wall. Pl. As. Rar. I. 40, t. 46 and Cat. 2781 A and B; Miq. Fl. Ind. Bat. I. i. 848 and Ann. Mus. Lugd.-Bat. I. 106; A. DC. in Prodr. XVI. ii. 85; Kurz For. Fl. II. 486; Brandis For. Fl. 489 and Ind. Trees 629; Hook. f. Fl. Br. Ind. V. 609; Wenzig in Jahrb. Bot. Gart. Berl. IV. 224; Oudem. Annot. Cupul. Jav. 5. 6, t. 1, 4 fig. 1; Koord. & Val. Bijdr. X. 39; King in Ann. Calc. II. 47, t. 41; Koord. Exkurs. Fl. Jav. II. 65. *Q. squamata*, Roxb. Fl. Ind. III. 638; Wight Ic. t. 213. *Q. grandifolia*, G. Don in Spreng. Syst. III. 856; Prodr. Fl. Nep. 57. *Q. Arcaula*, Ham. Ms. in Spreng. Syst. III. 857; Blume Mus. Bot. Lugd.-Bat. I. 290. *Q. elegans*, Blume in Bataav. Verh. IX. 208, Bijdr. 518 and Fl. Jav. Cupul. 21, t. 10; Oudem. Annot. Cupul. Jav. 5, 9, t. 2, 3. *Q. pyrifolia*, Blume Mus.

Bot. Lugd.-Bat. I. 304; Miq. Fl. Ind. Bat. I. 864. *Q. racemosa*, Jack in Mal. Misc. VII. 86; Korth. in Verh. Nat. Gesch. Bot. 205. *Q. glaberrima*, Bl. Verh. l.c. 210, t. 2, Bijdr. 519 and Fl. Jav. Cupul. 17 t. 18; Miq. Pl. Jungh. I. 10. *Q. depressa*, Bl. Verh. l.c. 209, t. 1. *Q. litoralis*, Bl. Mus. Bot. I. 303; Koord. & Val. Bijdr. X. 65. *Q. sphacelata*, Bl. Mus. Bot. I. 304; Koord. & Val. l.c. 65. *Q. placentaria*, Bl. Bijdr. 513; Fl. Jav. l. c. 19, t. 9.

DISTRIB. India, Burma, Malay Peninsula and Archipelago. Vern. 'Mempening Bungkus,' 'Berangan Padi' (Ridley).

Var. *gracilipes*, A. DC. Prodr. XVI. ii. 86. Leaves lanceolate or oblanceolate, gradually narrowed into the long petiole; cupule prominently scaly; acorn rounded and depressed at apex. Hook. f. Fl. Br. Ind. V. 610; King Ann. Calc. II. 48, t. 42—4; Koord. l.c. 66. *Q. gracilipes*, Miq. in Fl. Ind. Bat. Suppl. 347.

PROVINCE WELLESLEY: at Bukit Mutayaim, Curtis 2829!. PERAK: in dense forest up to 150 m. alt., Goping District, King's Collector 6085!, 6118!, 8228!; in Upper Perak at 300 m. alt., Wray 3772!; Scortechini!. MALACCA: Maingay K.D. 1456!. SINGAPORE: Maingay K.D. 1457!; at Bukit Timah, Ridley 4441!; at Sungei Udang, Derry 424!.—DISTRIB. India (Khasia Hills), Burma, Sumatra.

Var. *microcalyx*, A. DC. l.c. Leaves small; fruit small; cupules often solitary or subconnate; acorn with usually a conical apex. King in Ann. Calc. II. 48, t. 43 9—11. *Q. microcalyx* and *Q. anceps*, Korth. in Verh. Nat. Gesch. Bot. 204 and 206; Oudem. Annot. Cupul. Jav. 6. t. 4 fig. 3; A. DC. l.c. 86. (excl. syn. *Q. turbinata*, Roxb. and *Q. Thomsoni*, Miq.). *Q. Arcaula*, Ham. var. *microcalyx*, Blume Mus. Bot. Lugd.-Bat. I. 290. *Q. Rhioensis*, Hance in Journ. Bot. (1878) 198.

PERAK: King's Collector 10947!.—DISTRIB. Rhio, Java, Sumatra.

6. *PASANIA GRANDIFRONS*, Gamble. A very large tree reaching a height of 18—30 m. and 60—90 cm. in diam. of stem, branches spreading; branchlets brown, smooth, grooved, minutely puberulous. Leaves very large, coriaceous; elliptic-oblong, abruptly caudate-acuminate at apex with an obtuse acumen, rounded or cordate, often unequally, at base; upper surface glossy green when fresh, brown and shining when dry, lower silvery grey when fresh, dull and pale when dry; 20—40 cm. long, 6—18 cm. broad; mid-



rib thick, deeply impressed but strongly keeled above, prominent beneath; main nerves 12—20 pairs, regular, parallel, the lowest 2—3 somewhat deflexed, the rest straight to near the margin where they curve to join in loops, raised on both surfaces; transverse nervules many, nearly straight and parallel, again joined by numerous close parallel nervules enclosing the areolate reticulation; petiole very stout, under 1 cm. long. *Spikes* mostly ♂, in slender, brown-hoary, terminal panicles 20 cm. or more long; bracts of the panicle-branches ovate, obtuse, auriculate, early caducous. *Flowers*: ♂ glomerulate in rather distant elongate clusters, gradually closer towards the top; cluster-bracts ovate-acute, 2 mm. long; flower bracteoles similar but smaller; flowers usually oblong; perianth-lobes 6, very short, obtuse, stellate-pubescent outside, nearly glabrous within; stamens 12, filaments slender, anthers globose; pistillode large, often oblong, very villous: ♀ solitary with short truncate styles. *Fruits* distant, in stout woody spikes up to 20 cm. long; pedicels very stout, hoary, about 5 mm. long, usually bilamellate, the lower without scales, the upper with a row of rather large ones: cupule when young with the edges incurved and embracing  $\frac{3}{4}$ ths of the acorn, when ripe saucer-shaped, flat at base, very shallow (about 4 mm. deep), 2 cm. in diam., the edges not incurved, embracing only the base of the acorn; scales ovate-acuminate, pubescent, imbricate, closely appressed except the free sharp apices, when quite young in more or less annular series; acorns ovoid-conic when young, globose-conic with a flat base when adult, glabrous except slight pubescence round the umbo, shining, smooth, 2 cm. in diam., 15 mm. high, the umbo small. *Quercus grandifrons* King in Hook. f. Fl. Br. Ind. V. 610 (1888) and in Ann. Calc. II. 49, t. 83 B.

PENANG: at Penara Bukit, *Curtis* 3042!. PERAK: in dense forest in Larut up to 1000 m. alt. or more, *King's Collector* 3786!, 4867!, 4872!, 5365!, 6544!, 6604!, 7259!; *Scortechini*!; at Relau Tujur, *Wray* 2615!.

7. PASANIA FALCONERI, Schky in Engl. Bot. Jahrb. XLVII. 676 (1912). A small tree; branchlets stout, dark brown, shining, with prominent white lenticels; resting buds large, prominently sheathed in many pale lanceolate acuminate silky-puberulous scales reaching 2 cm. long and somewhat long persistent. *Leaves* thinly coriaceous; linear-oblong or oblong-lanceolate or -oblanceolate, acuminate often cuspidately at apex, acute or somewhat rounded at

base; upper surface green, brown when dry, shining, somewhat bullate, glabrous, lower yellowish when fresh, brown when dry, often puberulous along the midrib near the base otherwise glabrous; margins recurved when dry; 20—45 cm. long, 5—8 cm. broad; midrib stout, flattened and slightly raised on the upper, much raised on the lower, surface; main nerves 12—20 pairs, distant, impressed above, straight at first or slightly curved to near the margin and then prominently curved to join in loops; transverse nervules few, irregular, not prominent; reticulation minutely areolate but obscure; petiole very stout, 5—10 mm. long. *Spikes*: ♂ slender, erect, up to 15—20 cm. long from the axils of the perulate scales of the terminal shoots, which shoots elongate and are tawny-villous like the spike-rhachises; bracteoles ovate, acuminate, villous, 2—3 mm. long: ♀ slender, up to 20 cm. long; rhachis tawny-villous; bracteoles long lanceolate. *Flowers*: ♂ single or in clusters of few together at short intervals along the spikes; perianth-lobes 6, ovate, subacute, villous, 1.5 mm. long; stamens 12, with slender filaments and small globose anthers; pistillode rather small, circular, villous: ♀ solitary, scaly, imbricate, perianth-lobes shorter than in ♂, styles short, glabrous, spreading. *Fruits* in very long (often 40 cm.) spikes, the fertile mixed with many abortive, single or in pairs; rhachis stout, tawny-villous; pedicel 0 or under 2 mm. long; cupule in young fruits enclosing half the conical glabrous prominently umbonate acorn, when mature saucer-shaped closely velvety within and with the margins finally reflexed, 15—25 mm. in diam. and 5 mm. high embracing the base of the acorn, the scales ovate, acute, puberulous, reddish, closely appressed even to the apex; acorn ovoid-cylindric, glabrous, 20—25 mm. high and 17—22 mm. in diam.; umbo rounded, blunt, rather short, stigmas persistent. *Quercus Falconeri*, Kurz in Journ. As. Soc. Beng. II. 197 (1875), For. Fl. II. 485; Hook. f. Fl. Br. Ind. V. 608; King in Ann. Calc. II. 42 t. 34. *Quercus minor*, Ridl. in Journ. Str. Br. R. As. Soc. No. 57, 95 (1910).

KEDAH: Langkawi Island, *Curtis* 1677!, *Ridley* 9836!, 15494, 15791!; Alor Sta., *Ridley* 14960!. PERAK: in Upper Perak at about 90 m. alt., *Wray* 3410!, 3776!; at Temango, *Ridley* 14689!. DISTRIB. Tenasserim *Falconer* 458!, *Lace* 4768!.

8. PASANIA LAMPONGA, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets fairly stout, dark-brown to black, smooth, marked by numerous very prominent pale lenticels, glabrous or the youngest

pulverulent. *Leaves* subcoriaceous; elliptic or elliptic-lanceolate, rarely oblong-lanceolate, shortly and rather abruptly caudate-acuminate at apex, acute at base; leaves when fresh bright green above silvery grey beneath, when dry olive-brown and somewhat shining and glabrous above, ashy-grey and dull and slightly pubescent beneath; 7—15 cm. long, 3—5 cm. broad; midrib slender, keeled above; main nerves 9—10 pairs, parallel, curved gently to and along the margin; transverse nervules rather scanty, subparallel, enclosing the areolate reticulation which is usually punctate on the upper surface; petiole 5—8 mm. long, channelled above. *Spikes* slender, ♂ or androgynous in many-branched terminal panicles, up to 15 cm. long, the androgynous spikes few the ♀ flowers below; rhachises minutely grey-pulverulent. *Flowers*: ♂ solitary or in groups of 2—4, rather distant; bracts ovate-acute, pubescent, 1—2 mm. long; perianth lobes 6, rounded, 1 mm. long, crisply villous without, nearly glabrous within; stamens 12 with long rather thick filaments and small reniform anthers; pistillode circular densely white-villous: ♀ single or in pairs; bracts as in ♂ also perianth-lobes but these are shorter; styles 3, conical, spreading, glabrous. *Fruits* in rather slender erect spikes about 7—8 cm. long, the rhachises woody pubescent and lenticellate as the branchlets; pedicels none or up to 5 mm. long, stout, scaly; cupules when quite young covered with soft blunt scales and enclosing the acorn, when older the scales apiculate and about  $\frac{1}{2}$ — $\frac{2}{3}$  of the acorn enclosed, when ripe the cups shallow, minutely sericeous, saucer-shaped with vertical sides, 16—18 mm. in diam. and 5—6 mm. deep embracing only the base of the acorn; scales broad, connate, with acute appressed apices, and arranged in faint but regular rings; acorns ovoid-conical, tawny-velvety, 15—18 mm. in diam. and nearly 2 cm. high; umbo sharp, under 1 mm. long. *Quercus Lamponga*, Miq. Fl. Ind. Bat. Suppl. 348 (1862); A. DC. Prodr. XVI. ii. 95; Miq. Ann. Mus. Lugd.-Bat. I. 109; Wenzig in Jahrb. Bot. Gart. Berl. IV. 229; Hook. f. Fl. Br. Ind. V. 611; King Ann. Calc. II. 53, t. 49. *Q. brevipetiolata*, Scheff. Observ. Phyt. II. 47. *Cyclobalanus Lamponga*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PROVINCE WELLESLEY: at Nibong Tebal, *Curtis* 3471!. PERAK: in dense forest up to 150 m. alt., Larut, *King's Collector* 3878!, 5413!, 6455!, 6479!, 6490!, 6578!, 6756!, 6910!, 7278!; Larut, *Scortechini* 1472!, etc.; at Lower Camp, Gunong Batu Putih, *Wray* 7468!; at Thaipeng, *Wray* 2699! SINGAPORE: Pulau Ubin, *Ridley*

9479!; at Budit Timah *Ridley* 6442!.—DISTRIB. Sumatra (Lampongs, *Teysmann*), Bangka, Borneo, New Guinea.

Var. *Ewyckiioides*, Gamble. Branchlets paler. Leaves smaller, rarely over 10 cm. long and 4 cm. broad, the bases more acuminate, more silvery beneath, main nerves closer and more numerous. Spikes more slender, the bracts of the flowers longer and more conspicuous. Fruits with the cups more lamellate and the points of the scales less prominent though present.

PERAK: in dense forest up to 300 m. alt., *King's Collector* 4449!, 6503!, 7777!, 10884!; at Assan Numlong, *Wray* 2570!. SELANGOR: Pahang track, *Ridley* 8502!; at Kwala Lumpur, *Ridley's Collector* 5011!. MALACCA: at Brisu, *Derry* 400!. SINGAPORE: at Seeleetah, *G. King*!; in garden jungle, *Ridley* 1606!, 4003!; at Chan Chu Kang, *Ridley* 3387!; *Hullett* 119!.

This is the form which *King* has called, on the sheets of the Calcutta Herbarium, "*Q. Lamponga*, Miq. passing into *Q. Ewyckii*, Korth." In leaves it resembles *Q. Ewyckii* more than *Q. Lamponga* but the conical velvety acorns are those of *Q. Lamponga* and the scales of the acorn-cups though rather more prominently lamellate, yet show clearly that they are connate and apiculate so that I consider it to be more nearly allied to the latter species.

9. *PASANIA WALLICHIANA*, Gamble. A large tree reaching a height of 12–18 m. and 40–60 cm. in diam. of stem; branches spreading; branchlets stout, pale brown or greyish-brown, minutely lenticellate, puberulous, the youngest cinereous-tomentose; bud-scales ovate, acute, tomentose. Leaves coriaceous; oblong-lanceolate or -oblanceolate, abruptly caudate-acuminate at apex, acuminate at base; upper surface glossy green when fresh, brown and shining when dry, glabrous except the midrib, lower silvery grey, glabrous or puberulous; 12–20 cm. long, 3–8 cm. broad; midrib rather slender, prominent, raised and pubescent on both surfaces; main nerves 8–14 pairs, prominent beneath, at first parallel and straight, curved close to the margin and joining in loops; transverse nervules irregular, enclosing the rather obscure reticulation; petiole 8–12 mm. long. Spikes solitary, and axillary or in small terminal panicles, up to about 20 cm. long, ♂ only or androgynous, the ♂ above, the ♀ below. Flowers: ♂ loosely glomerulate in oblong sessile patches; bracts subulate, 1–2 mm. long; perianth-lobes 6, very short, obtuse, villous without; stamens 12 with slender filaments and small globose anthers; pistillode large, round or oblong, villous: ♀ in rather distant clusters of 3–5; perianth inconspicuous; styles 3, conical, divergent. Fruits crowded in stout spikes

about 10—13 cm. long; pedicels thick, very short, woody; cupules when young cup-shaped, enclosing three-fourths of the acorn, then gradually opening out and when mature saucer-shaped, about 15 mm. in diam. and 3—4 mm. deep, embracing only the bases of the acorns, hoary puberulous; scales broad, appressed in obscure rings only the sharp minute apices free; acorns hemispheric, tawny-velvety, the apices conical, 15 mm. in diam., 10 mm. high; umbo apiculate with the remains of the stigmas. *Quercus Wallichiana*, Lindl., in Wall. Cat. 2778 (1831); Hance in Seem. Journ. Bot. VIII. 4; Trim. Journ. Bot. (1874) 241; Hook. f. Fl. Br. Ind. V. 610; King Ann. Calc. II. 51, t. 46.

PENANG: *Wallich* 2778!; *King*!; *Stoliczka*!; on Government hill at 300 m. alt., *Curtis* 120!, 253!, 365!; at about 300—600 m. alt., *King's Collector* 1515!, 1573!, 1795!, 2279!, 5199!. PERAK: in open forest, Larut, to 450 m. alt., *King's Collector* 4853!, 5195!; top of low hills, Ulu Bubong, *King's Collector* 10832!. SELANGOR: Pahang track, *Ridley* 8502!. MALACCA: *Griffith* K.D. 4467; *Main-gay* K.D. 1460—2!, 1532!; at Sungei Hudang, *Goodenough* 1362!. SINGAPORE: at Selitar, *Ridley* 5113!, 5114!; at Pulau Ubin, *Ridley* 9479!; at Turong, *Ridley* 3384!

10. PASANIA SUNDAICA, Oerst. Kjoeb. Vidensk. Meddel. 83 (1866). A large tree reaching 12—18 and even 30 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets stout, greyish-brown, the young ones minutely fulvous-tomentose; bud-scales ovate, acute, very tomentose. *Leaves* thinly coriaceous; elliptic or elliptic-oblong or elliptic-subobovate, acute or shortly and obtusely acuminate at apex, attenuate or more or less rounded at base; dark green above when fresh, brown and dull when dry, furfuraceously pubescent especially on the nerves and midrib, then glabrous, silvery grey beneath when fresh, greyish-brown when dry and hoary-tomentose, glabrescent later on; 10—20 cm long, 5—10 cm. broad; midrib prominent, raised and tomentose on both surfaces; main nerves 10—15 pairs, parallel, the lowest 2—3 pairs rather near the base, nearly straight to the margin where they curve abruptly to join in diminishing loops, raised on both surfaces and pubescent; transverse nervules subparallel, slightly arched; reticulation obscure; petiole stout, 5—7 mm. long. *Spikes* in large much branched spreading terminal panicles, up to 20 cm. long, ♂ much more numerous than ♀, sometimes androgynous, ♂ above ♀ below; rhachises densely furfuraceously

fulvous or ashy tomentose; bracts ovate lanceolate very caducous. *Flowers*: ♂ solitary or in rather loose clusters; bracts ovate-subulate about 1 mm. long; perianth-lobes 6, short (under 1 mm. long), ovate, obtuse or slightly acute, spreading, villous without; stamens 12 or more, with slender filaments and very small globose anthers; pistillode large, round, very villous: ♀ solitary or in groups of 2—4; bracts as in ♂; perianth-lobes ovate shorter than in ♂, pedicel and base covered with subulate blunt often reflexed scales; styles 3, conical, divergent. *Fruits* in stout erect spikes 10—15 cm. long, single or rarely in groups of 2—4; pedicels stout, about 4 mm. long, scaly; cupules saucer-shaped, flat, the margins incurved when immature at first quite embracing the acorn, later half embracing it, erect when ripe, 15—23 mm. in diam., 2—3 mm. deep and so embracing only the base of the acorn; scales broadly ovate, connate, tawny-pubescent, sometimes more or less in rings, the apices sharp, spreading or even deflexed; acorn globose-conic or ovoid-conic, glabrous, the base truncate when ripe, 2 cm. high and 2.5 cm. in diam.; umbo prominent, sharp, often 2—3 mm. long, with the remains of the styles. Schky in Engl. Bot. Jahrb. XLVII. 675. *Quercus sundaica*, Blume Verh. Bat. Genootsch. IX. 216 (1825), Bijdr. 520, Fl. Jav. Cupul. 11, t. 2—3 and Mus. Bot.-Lugd.-Bat. I. 292; Miq. Fl. Ind. Bat. I. i. 850 and Ann. Mus. Lugd.-Bat. I. 109; A. DC. Prodr. XVI. ii. 89; Oudem. Annot. Cupul. Jav. 11; Hook. f. Fl. Br. Ind. V. 611; King Ann. Calc. II. 51, tt. 47, 48; Koord. & Val. Bijdr. XI. 31; Koord. Exkurs. Fl. Jav. II. 63. *Q. mappacea*, Korth. Verh. Nat. Gesch. 202; Miq. Fl. Ind. Bat. I. i. 850. *Q. Korthalsii*, var. *mappacea*, Blume Mus. Bot. I. 293; A. DC. l.c. 90. *Q. pseudomolucca*, Bl. vars. *Korthalsii* and *sundaica*, Wenzig in Jahrb. Bot. Gart. Berl. I 227. *Q. muricata*, Roxb. Fl. Ind. III. 635.

PENANG: Maingay K.D. 1530!; on Penang hill *G. King*!; Government Hill, Vern. 'Brangen Babie' *Curtis* 442!; at elevations of from 300 to 750 m., *King's Collector* 1622!, 1627!, 1692!, 1780!, 2264!, 2274!, 2282!, 2284!, 4837!, 4840!; at Bellevue, *Ridley* 10784!. PERAK: in forest up to about 750 m., Larut, *King's Collector* 2232!, 3272!, 3341!, 3502!, 3681!, 3866!, 3944! 4870! 4944!, 5543! 6583! 7013!, 7241!, 7254!, 7371!; at Thaipeng, *Wray* 3103!; *Scortechini*!. MALACCA: at Hulu Chemliong, *Derry* 1131!; at Ayer Panas, *Ridley* 1113! (doubtful). JOHORE: at Kwala Sembrong, *Lake and Kelsall* 4014!.—DISTRIB. Java, Sumatra (*Forbes* 2933!, 3144!). Borneo. Vern. 'Mempening Bagan' (*Ridley*).



11. *PASANIA HYSTRIX*, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam of stem; branches spreading; branchlets densely fulvous-tomentose; bud-scales broadly ovate, acute, somewhat persistent. *Leaves* coriaceous; elliptic or elliptic-oblong, acute or shortly cuspidate at apex, acute at base; upper surface deep green when fresh, olive-brown when dry, furfuraceous-pubescent especially on the nerves, when old nearly glabrous and shining, lower pale also furfuraceous-pubescent, the hairs on both sides often stellate; margin recurved; 10—22 cm. long, 4—8 cm. broad; midrib stout, raised on both surfaces and densely tomentose; main nerves 12 to 16 pairs, parallel, slightly curved to close to the margin and then suddenly bending along it and meeting in diminishing loops; transverse nervules many, arched, prominent beneath; reticulation obscure; petiole stout, 6—7 mm. long. *Spikes*: ♂ in terminal panicles densely fulvous-tomentose, reaching 15 c.m. in length; ♀ solitary, axillary, up to 10 cm. long; bracts short, ovate acuminate, early caducous. *Flowers*: ♂ solitary or in clusters, the bracteoles lanceolate; perianth 1 mm. long, the 6 lobes obtuse; stamens 12 with slender exert filaments and small reniform anthers; pistillode cushion-like, circular, very villous; ♀ solitary with a lanceolate bracteole as in ♂ densely covered with short usually spreading or reflexed conical scales; perianth as in ♂ but smaller; styles 3, conical, small. *Fruits* in stout spikes up to 12 cm. long, solitary or rarely with 1 or 2 abortive at the base; pedicel thick, obconic, flattened, 5 mm. long; cupule when young nearly enclosing the acorn, funnel-shaped, the margins incurved, the scales long, soft, spreading or reflexed, when ripe saucer-shaped embracing only the base of the acorn, 2 cm. in diam. and 5 mm. high, the margin only slightly incurved, the scales ovate, sharp, fulvous-tomentose, connate, the apices erect or recurved, rings rather obscure; acorn conico-hemispheric, with truncate base, glabrous when ripe, about 1 cm. high without the very prominent cylindric umbo. *P. Korthalsii*, Oerst. in Kjoeb. Vidensk. Meddel. 83 (1866). *Quercus Hystrix*, Korth. Verh. Nat. Gesch. Bot. 201 t. 43 (1839—1842); Wenzig in Jahrb. Bot. Gart. Berl. IV. 223; Hook. f. Fl. Br. Ind. V. 611; King Ann. Calc. II. 54, t. 50. *Q. Korthalsii*, Blume var. *Hystrix*, Bl. in Mus. Bot. Lugd.-Bat. i. 293; A. DC. Prodr. XVI. ii. 90; Oudem. Annot. Cupul. Jav. 11. *Castanea ? furfurella*, Miq. Fl. Ind. Bat. Suppl. 352; Ann Mus. Lugd.-Bat. I. 108. *Cyclobalanus Hystrix*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PERAK: in open forest at Ulu Bulong, etc., up to 250 m. alt., *King's Collector* 7865!, 10636!; *Scortechini*!. MALACCA: *Griffith* K.D. 4473!; *Maingay* K.D. 1458!; at Bukit Bruang, *Curtis* 3645! at Sungei Hudang and Hulu Chembrong, *Derry* 1124!, 1131!; at Selandan and Ayer Panas *Ridley* 10765!, 10789!. SINGAPORE: *G. King*!; *King's Collector* 1253!; at Toas, *Ridley* 3383!.—DISTRIB. Sumatra. Vern. 'Mempening or Kampuning.'

Var. *longispica*, Gamble. *Spikes* (in young fruit only) up to 20 cm. long with the fruits in threes or rarely solitary; cupule scales in rings, soft, fulvous-tomentose, appressed.

PERAK: *Scortechini* (without number or locality).

I have thought it best to make this a variety, the leaves are like those of *P. Hystrix* though rather more prominently nerved, but the young fruits differ a good deal. When it is better known, it may prove to be a distinct species.

12. PASANIA CURTISII, Gamble. A tree reaching 9—12 m. in height and 60 cm. or more in diam. of stem; branches spreading; branchlets pale brown, glabrous, with shining smooth bark and many prominent lenticels. *Leaves* thinly coriaceous; elliptic-oblong or -ovate or -lanceolate, obtusely long caudate-acuminate at apex, acuminate at base; glossy bright green above, pale silvery below when fresh, both surfaces pale live-brown when dry and glabrous; margins slightly recurved; 12—25 cm. long, 5—8 cm. broad; midrib prominent, raised on both surfaces; main nerves 9—10 pairs, distant, slender, obliquely curving to and along the margin where they almost disappear, inconspicuous above, prominent beneath; transverse nervules few, irregular, enclosing the obscure areolate reticulation; petiole stout, 4—6 mm. long. *Spikes* numerous, very long (up to 20 cm.) and slender in clusters some single some in panicles from the upper axils of the leaves, ♂ most numerous, but ♀ frequent, occasional spikes androgynous; rachises grey-puberulous, angular. *Flowers*: ♂ solitary or sometimes few together on the angles of the rachis; bracteoles small, ovate, pubescent; perianth lobes 6, ovate, spreading, ciliate, about 1 mm. long; stamens 12 with slender filaments and small globose anthers; pistilode cushion-like, white-villous, rather small and circular: ♀ (some ♂) solitary, bracteole as in ♂, base with imbricate rounded scales perianth-lobes as in ♂ and rather prominent; styles 3—4, long, subulate, glabrous; stamens in ♂ flowers very small perhaps without fertile pollen. *Fruits* crowded and touching but not connate, in

long-peduncled spikes up to about 10—12 cm. long, the rhachises woody, but not very stout; pedicel none; cupules in quite young fruit cup-shaped and embracing half the acorn, later on quite flat and thin, 18 mm. in diameter, applied to the base of the acorn; scales closely connate, imbricate, appressed, only the minute apices free; acorn when young flattened hemispheric-conical, when old ovoid, puberulous, 2 cm. high and as much in diam.; umbo conspicuous. *Quercus Curtisii*, King in Hook. f. Fl. Br. Ind. V. 612 (1888) and in Ann. Calc. II. 56, t. 52.

PENANG: at Waterfall, *G. King*, August 1879!; *Curtis* 1253!; in forest up to 240 m. alt., *King's Collector*, 4833!, 4836! 4832! 4854!. PERAK: at Larut up to 300 m. alt., *King's Collector* 3304!, 4902!, 10678!. SELANGOR: at Rawang, *Ridley* 12062!.

13. PASANIA CONOCARPA, Schky in Engl. Bot. Jahrb. XLIX 357 (1913). A large tree reaching 18—24 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets stout with light brown bark, the youngest and young leaves densely covered with minute rufous stellate tomentum; resting buds ovoid, grey-tomentose, their scales lanceolate, 5 mm. long, deciduous. *Leaves* coriaceous; elliptic-oblong or lanceolate, abruptly caudate-acuminate at apex for about 1 cm. the tip obtuse, acute at base; upper surface at first minutely stellate-puberulous, afterwards glabrous and shining, the midrib tomentose, lower surface stellate-tomentose, grey or pale brown; margins sometimes undulate; 7—15 cm. long, 3—6 cm. broad; midrib raised on both surfaces; main nerves 10—14 pairs, prominent beneath, slightly curving to join in arches near the margin; transverse nervules prominent, irregular and branching; reticulation obscure; petiole 3—8 mm. long, tomentose. *Spikes*: ♂ solitary and axillary, with prominent bracts, rather short, sometimes the ♂ flowers ending the ♀ spikes: ♀ in terminal panicles up to 15 cm. long, all greyish stellate-tomentose. *Flowers*: ♂ in fascicles of 1—3, sessile, bracteole lanceolate 1—2 mm. long; perianth-lobes very short, obtuse, subglabrous within; stamens 12, with slender filaments and small globose anthers; pistillode rather small, circular, densely villous: ♀ solitary, bracteole as in ♂, base cylindric, styles 3, spreading. *Fruits* when ripe touching and mixed with many undeveloped ones; in spikes with a woody rhachis up to 10 cm. long; cupules puberulous, when young obovoid nearly completely embracing the young acorn, the lamellae few but prominent and denticulate, when ripe embracing only the base of

the acorn, saucer-shaped, 15—18 mm. in diam., 5—6 mm. deep, with 5—6 denticulate lamellae; acorn glabrous or silky-pubescent, ovoid-conical with truncate base, 15—20 mm. high and about 18 mm. in diam.; umbo very prominent, long and sharply tipped with the persistent styles. *Quercus conocarpa*, Oudem. in Versl. en Mededeel. XII. 203 (1868) and Annot. Cupul. Jav. 18, t. 10 (1863). Miq. in Ann. Mus. Lugd.-Bat. I. 113; A. DC. in Prodr. XVI. ii. 93; Wenzig in Jahrb. Bot. Gart. Berl. IV. 230; Hook f. Fl. Br. Ind. V. 612; King Ann. Calc. II. 61, t. 56 A; Koord. & Val. Bijdr. X. 50; Koord. Exkurs. Fl. Jav. II. 68. *Cyclobalanus conocarpa*, Oerst. Kjoeb. Vidensk. Meddel. 81. (1866).

PERAK: at Goping and Ulu Bubong, in open forest up to 250 m. alt., *King's Collector* 821!, 5816!, 58146!, 10519!; *Scortechini*!. SINGAPORE: *Cantley* 182; *King's Collector* 1249!; at Selitar, Changi and Chanchukang, *Ridley* 5115!, 5116!, 5118!, 5989!; *Hullett* 622!.—DISTRIB. Java, Sumatra, Borneo.

The Perak, Singapore and Bornean specimens differ from Oudemans' type from Java in having the leaves more abruptly caudate-acuminate and the acorns glabrous, otherwise they agree as King has pointed out. King's identifications have been confirmed apparently by Koorders, but I cannot help feeling that better specimens from Java might show that the Peninsular and Bornean tree is at least a well-marked variety.

14. *PASANIA EWYCKII*, Gamble. A large tree reaching a height of 18—24 m. and a diam. of stem of 70—100 cm.; branches spreading; branchlets rather stout, brown, with scattered white lenticels, the youngest more slender lepidote-puberulous; resting buds small, scales linear-lanceolate. *Leaves* thinly coriaceous; lanceolate or oblong-lanceolate, long caudate-acuminate at apex, acute at base; upper surface when young slightly lepidote afterwards glabrous, lower silvery-grey-lepidote-pubescent; margins entire or sometimes undulate; 10—15 cm. long, 4—6 cm. broad; midrib stout, raised on both surfaces; main nerves 11—14 pairs, slightly raised above, parallel, at first nearly straight, curving near the margin to join in diminishing loops; transverse nervules many, oblique, nearly straight, parallel, enclosing the minutely areolate reticulation; petiole 7—11 mm. long, partly bordered by the decurrent margins of the blade. *Spikes*: ♂ up to 10 cm. long, in few-branched, rather contracted terminal panicles; rhachis angular, lepidote-puberulous; bracteoles ovate acute, 1 mm. long: ♀ solitary, at the base of the ♂ panicle. *Flowers*: ♂ solitary or in clusters of 3—4; perianth subcylindric, pubescent, 1—1.5 mm. long, lobes 6 very short; stamens

12, filaments slender, anthers ovate, small, minutely apiculate; pistillode large, very villous, whitish when dry. *Fruits* in spikes up to 25 cm. long with a stout rhachis; pedicel much thickened, 0—7 mm. long, annulate; cupules very thin, when young enclosing nearly the whole acorn, when mature saucer-shaped embracing only the lower third of the acorn, minutely grey-tomentose, 2—2.5 cm. in diam., 5—6 mm. deep; lamellae about 7—10, fairly distinct, usually entire; acorn hemispheric or ovoid-conic about 2 cm. in diam. and 1.5 cm. high, truncate and intruded at base, glabrous except close under the umbo which is sharp and conical. *Quercus Ewyckii*, Korth. in Verh. Nat. Gesch. Bot. 212, t. 46 (1839-42). Bl. in Mus. Bot. Lugd.-Bat. I. 300; A. DC. Prodr. XVI. ii. 94; Wenzig in Jahrb. Bot. Gart. Berl. IV. 230; King Ann. Calc. II. 68, t. 62 A. *Cyclobalanus Ewyckii*, Oerst. in Kjoeb. Vidensk. Meddel. XLVII. 80.

PERAK: in open forest on low hills at 150—250 m. alt. *King's Collector* 7846!. SINGAPORE: at Bukit Timah, *Goodenough* 396!. —DISTRIB. Sumatra (*Korthals*!).

Var. *latifolia*, King in Ann. Calc. II. 68, t. 62 B. *Leaves* chartaceous, elliptic ovate, more shortly and obtusely caudate acuminate, transverse nervules not quite so close or so straight; cupules thicker, the lamellae denticulate; acorn longer, up to 2 cm., densely grey-sericeous-pubescent. Hook. f. Fl. Br. Ind. V. 614 (acorn described as glabrous).

PERAK: in open forest in rocky places near Thaipeng up to 250 m. alt., *King's Collector* 8532!. SINGAPORE: at Bukit Timah, *Ridley* 5117!

When in leaf only this species can easily be mistaken for *P. Lamponga*.

15. PASANIA CYRTORHYNCHA, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets stout, with smooth shining pale grey bark and scattered lenticels, innovations scaly, grey-puberulous as also the inflorescence, youngest leaves blackish when dry as are the buds and bud-scales. *Leaves* chartaceous; elliptic or elliptic-oblong, abruptly shortly (under 1 cm.) obtusely caudate-acuminate at apex, rounded or sometimes cuneate at base; upper surface glabrous, not shining, reddish-brown when dry, lower pale and covered especially when young with very minute grey stellate pubescence; margin entire; 12—22 cm. long 6—10 cm. broad; midrib stout, raised on both surfaces; main nerves 10—15 pairs, slightly curved to about

1 cm. from the margin and then joined by somewhat angular often gradually diminishing loops; transverse nervules prominent, rather irregular, enclosing the areolate rather obscure reticulation; petiole about 5 mm. long; stipules linear, about 5 mm. long, caducous. *Spikes*: ♂ up to about 15 cm. long, in large spreading grey-puberulous terminal panicles; rhachises slender, angular; bracteoles linear-lanceolate, 1.5 mm. long; ♀ solitary, axillary. *Flowers*: ♂ solitary or in clusters of 2—4, the lower distant, the upper close; perianth cup-shaped, 1 mm. long, sub-glabrous within, lobes 6, ovate acute; stamens 12, filaments slender, recurved or spirally twisted, anthers slightly oblong; pistillode densely villous, nearly white when dry, circular or oblong in outline. *Fruits* solitary, sessile, in stout spikes up to 15 cm. long; rhachises very stout, pale grey like the branchlets; cupules when young campanulate, when mature very thin, saucer-shaped, embracing the lower half of the acorn, about 23 mm. in diam., 6—7 mm. deep; lamellæ 6—7, rather thin and indistinct, the margins undulate with very obscure minute teeth; acorn broadly hemispheric, truncate and intruded at base, chestnut-brown, shining and smooth, glabrous except just under the umbo, diam. as the cupule, height with the umbo 17 mm.; umbo small, conical. *Quercus cyrtorhyncha*, Miq. Fl. Ind. Bat. Suppl. 350 (1862); A. DC. Prodr. XVI. ii. 105; Hook. f. Fl. Br. Ind. V 613; King Ann. Calc. II. 66, t. 60 B.

PERAK: in various localities at from 150 to 900 m. alt., *King's Collector* 4898!, 5820!, 7117!, 10809!, 10944!. SELANGOR: at Ginting Bidai, *Ridley* 7615!.—DISTRIB. Sumatra, Borneo.

16. PASANIA BENNETTII, Gamble. A tree; branchlets moderately stout to slender, the bark dark brown, innovations glabrous as are all parts except the inflorescence. *Leaves* coriaceous; broadly elliptic, abruptly obtusely cuspidate at apex, acuminate narrowed at base; upper surface dull, smooth, lower whitish when fresh greyish-brown when dry; 7—12 cm. long, 3—7 cm. broad; midrib stout and broad, raised above; main nerves 18—12 pairs, curved to near the margin and then joining in loops, faint on both surfaces; transverse nervules many, fairly regular and parallel, slightly arched, more numerous near the midrib; reticulation obscure; petiole slender, up to 1 cm. long, bordered almost to the base by the decurrent margins of the blade. *Spikes*: ♂ up to about 9 cm. long, in axillary or subterminal panicles of several branches, the rhachises angular, grey-puberulous; ♀ solitary or very few in axillary or



subterminal panicles, rachises as in ♂. *Flowers*: ♂ solitary; bracteole ovate, scarcely 5 mm. long; perianth 1—1.5 mm. long, tube cup-shaped, lobes 6, short, obtuse, slightly puberulous without; stamens 12, filaments slender, anthers globose, very small; pistillode large, densely villous: ♀ solitary; bracteole as in ♂, cupule annular, styles short, erect. *Fruits* when ripe nearly touching and mixed with many undeveloped ones, in spikes with a stout woody rachis up to about 7 cm. long; cupules puberulous, when young subcylindric with about 5 lamellæ and nearly completely enclosing the acorn, when ripe very shortly thickly pedicelled, saucer-shaped, about 1 cm. high and 2 cm. in diam., embracing only the base of the acorn; lamellæ distinct, the teeth of the scales also distinct though minute; acorn glabrous, ovoid-conic, 2 cm. in diam., 1.5 cm. high, base deeply intruded, umbo short. *Quercus Bennetti*, Miq. Fl. Ind. Bat. I. i. 857 (1855), Suppl. 348 (1862), and Ann. Mus. Lugd.-Bat. I. 112; A. DC. Prodr. XVI. ii. 94; Wenzig in Jahrb. Bot. Gart. Berl. IV. 235; Hook. f. Fl. Br. Ind. V. 612; King Ann. Calc. II. 64, t. 58 A. *Q. Miqueliana*, Scheff. Obs. Phyt. II. 48, III. 94.

PERAK: at Gunong Inas at 1500 m. alt., Wray 4095!, 4105!, 4126!. PAHANG: at Kluang Terbang, Barnes 10910!. JOHORE: at Tanjong Kupang, Hadji Senawi, etc., Ridley 6446!, 11060!, 12515!. SINGAPORE: Maingay K.D. 1460!; at Selitar, etc., Ridley 3960!, 6439!.—DISTRIB. Bangka (*Teysmann*, Kurz), Sumatra (*Teysmann*), Borneo (*Beccari*).

17. *PASANIA CANTLEYANA*, Gamble. A large tree reaching 24—30 m. in height and 60—90 cm. in diam. of stem, branches spreading; branchlets stout, angular, minutely lepidote-puberulous or glabrous, bark greyish-brown, smooth with prominent lenticels grouped at the bases of the fruit-spikes or in longitudinal patches on the internodes; bud-scales ovate, falcate, deciduous. *Leaves* rigidly coriaceous; oblong-lanceolate or oblanceolate, cuspidate-acuminate, often rather abruptly, at apex, attenuate and somewhat decurrent at base; upper surface very minutely lepidote-puberulous or glabrous, glossy-green when fresh, shining, olive brown when dry, lower surface more densely lepidote-puberulous, silvery grey when fresh, pale brown when dry; margins entire; 10—25 cm. long, 4—8 cm. broad; midrib stout, prominent and raised on both surfaces; main nerves 12—15 pairs, parallel, prominent on the lower surface, at first straight or only slightly curved, then

sharply curved close to the margin; transverse nervules many and nearly regular and parallel, enclosing the very minutely areolate reticulation; petiole stout at base, 15–20 mm. long, the upper half bordered by the decurrent margins of the blade. *Spikes*: ♂ solitary, axillary, reaching 15–20 cm. long; rhachises angular, grey-lepidote; bracteoles lanceolate, acuminate, 1–3 mm. long, prominent, especially on the lower part of the rhachis below the flowers: ♀ also solitary, axillary, up to 25 cm. long; rhachis stout, angular; bracteoles as in ♂. *Flowers*: ♂ solitary or subglomerulate; perianth cup-shaped, 1–1.5 mm. long, lobes 6, shallow, obtuse, villous within; stamens 12, filaments slender, anthers small, globose; pistillode cylindric, densely villous: ♀ in groups of 2–3 or sometimes solitary, on stout pedicels, soon reaching 5 mm. long and decurrent at their bases both above and below to the rhachis, young cups prominently scaly styles; 3, small. *Fruits* single or sometimes in pairs on a very stout woody pedicel along the thick rhachis of a woody raceme, when single the undeveloped ones remaining at the base; pedicel about 5–10 mm. long and 5 mm. thick at base, puberulous and 1–3-lamellate; cupule in young fruits depressed-globular embracing all but the apex and umbo of the acorn, when old saucer-shaped, embracing only the base of the acorn, 20–25 mm. in diam. and about 5 mm. high, softly minutely grey-puberulous, the margin thin, acute; lamellae about 5–7, obscurely denticulate; acorn depressed hemispheric, younger conical, the base deeply intruded, surface appressed silvery-grey-sericeous, 2 cm. in diam., 1.5 cm. high; umbo small, conical: *Quercus Canileyana*, King in Hook. f. Fl. Br. Ind. V. 613 (1888) and Ann. Calc. II. 64, t. 59.

PERAK: in dense forest up to 300 m. alt., Goping, Chanderiang, etc., *King's Collector* 5112!, 5121!, 5396!, 5475!, 5554!, 5623!, 5814!, 7274!. SINGAPORE: *Lobb*!; *Caniley* 149; at Changi, *Ridley* 3386!; at Bukit Timoh, *Ridley*!.

King remarks that the ♂ and ♀ flowers are apparently produced on different trees; only local investigation can show if this is invariably the case; certainly all the specimens available have either ♂ flowers only or only ♀, not both.

18. *PASANIA WENZIGIANA*, Gamble. A large tree reaching a height of 18–24 m. and about 40 cm. in diam. of stem, branches spreading; branchlets slender with dark brown shining bark and very small lenticels, all parts except the inflorescence glabrous. *Leaves* coriaceous; elliptic or elliptic-oblong, abruptly caudate-acuminate

at apex, the tip obtuse, acute or cuneate at base; upper surface shining, lower dull; margin recurved; 8—15 cm. long, 3—5.5 cm. broad; midrib stout, prominent on both surfaces; main nerves 12—14 pairs, indistinct, slightly raised on the upper surface, very slightly curved to about 5 mm. from the margin and then joining in somewhat angular loops with lesser loops outside them; transverse nervules few, irregular and branching, enclosing the minutely areolate reticulation; petiole slender, dark, 8—11 mm. long. *Spikes*: ♂ 10—15 cm. long, solitary and axillary or in lax, spreading, terminal, leafless panicles, rachises angular, grey-puberulous; bracteoles triangular-ovate, scarcely 1 mm. long, scurfy without: ♀ few, solitary, axillary. *Flowers*: ♂ solitary or in groups of usually 3; perianth cup-shaped, 1—1.5 mm. long, puberulous without, glabrous within, lobes 6, broad, ciliate; stamens 12 or sometimes more, filaments slender, anthers globose, small; pistillode cylindric, sericeous, white when dry and conspicuous: ♀ not known. *Fruits* in spikes up to 20 cm. long, usually solitary but sometimes 2—3 together one or more being undeveloped; rachis very stout, rough; pedicel thick, scarcely 3 mm. long; cupule saucer-shaped, embracing only the base of the acorn, 2 cm. in diam., 4—6 mm. deep, the upper margin slightly incurved; lamellae 5—7, sericeous, prominent, thick, the edges entire; acorns depressed-globose, glabrous below, grey-sericeous towards the apex, 2—2.5 cm. in diam., 12—15 mm. high, the base intruded; umbo conical. *Quercus Wenzigiana*, King in Hook. f. Fl. Br. Ind. V. 613 (1888) and in Ann. Calc. II. 65, t. 58 B. *Q. Diepenhorstii*, Wenzig in Jahrb. Bot. Gart. Berl. 231 (not of Miquel).

PENANG: Government Hill, etc., Curtis 360!, 368!. PERAK: in open forest near Goping, up to 150 m. alt., King's Collector 5955!. MALACCA: Griffith K.D. 4482!: Maingay K.D. 1527!.—DISTRIB. Borneo.

19. PASANIA RASSA, Gamble. A large tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets slender, dark-brown, rough, the innovations and inflorescence grey-pubescent, otherwise glabrous. *Leaves* coriaceous; narrowly lanceolate to elliptic-lanceolate, caudate-acuminate often obtusely at apex, acute at base and slightly decurrent; smooth on both surfaces, the upper shining, the lower dull and pale when dry; margins entire, recurved; 6—9 cm. long, 2—4 cm. broad; midrib slender, raised on both surfaces and sometimes pubescent; main nerves

obscure, 12—15 pairs, nearly straight to near the margin and there joined by somewhat angular loops, secondary nerves few; transverse nervules very irregular much branched enclosing the minutely areolate but obscure reticulation; petiole slender, 5—10 mm. long, occasionally (Sumatran specimens) longer, the upper part bordered by the decurrent margins of the blade. *Spikes* usually under 10 cm. long, slender, axillary or the ♂ in sparse terminal panicles, the ♀ solitary in lower axils; rhachis of ♂ very slender, angular, grey-pubescent, of ♀ stouter; bracteoles very minute, ovate-acute. *Flowers*: ♂ in glomerules of about 3, rarely solitary; perianth cup-shaped, small scarcely 1 mm. long, lobes 6, puberulous, ciliate on the margins; stamens 10, filaments slender, anthers globose; pistillode large, very villous, white when dry; ♀ solitary, sessile, cupule obscurely ringed; perianth-lobes as in ♂ but smaller; styles 3, very short. *Fruit* in spikes up to 10 cm. long, solitary, sessile; cupules obconic below, saucer-shaped above and quite shallow, thin, 10—12 mm. broad, 3—5 mm. high; when quite young embracing the whole acorn, when ripe its base only, the edges acute, spreading; lamellae 4—6, sericeous, when quite young denticulate, when old entire broad and thickened; acorn ovoid-conic, smooth and shining, glabrous except just around the umbo, 15 to nearly 20 (var. ? *montana*, Hook. f.) mm. in diam. and height, the base much intruded; umbo conic, sharp. *Quercus Rassa* Miq. Fl. Ind. Bat. Suppl. 350 (1862) and Ann. Mus. Bot. Lugd.-Bat. I. 112; A. DC. Prodr. XVI. ii. 95; Hook. f. Fl. Br. Ind. V. 113; King Ann. Calc. II. 66, t. 60 A.

PENANG: Government Hill, *Curtis* 362!; West Hill at 600 m. alt., *Curtis* 363!; in dense forest at 600—700 m. alt., *King's Collector* 1689!; on Penang Hill, *Ridley* 9369!, *Fox* 10647!. PERAK: *Scortechini* 329!; at about 1400 m. alt., *King's Collector* 6957!, 6983!. MALACCA: at Bukit Besar, *Ophir Ridley* 10021!. PENANG, at Gunong Tahan, 1800 m. alt., *Wray & Robinson* 5440!. —DISTRIB. Sumatra, Borneo, Java (fide *Koorders*).

Var. *lanuginosa*, *Ridley* M.S. in Herb. Kew. Branchlets, under surface and midrib and leaves fulvous-pubescent.

SELANGOR: top of Semangkoh Hill, 1300 m. alt., *Ridley* 15576!

The variability of this species is noticed in the Fl. Br. Ind. and it may be well here to call attention to *Ridley's* remarks on the subject in his paper on 'New and rare Malayan Plants' in Journ. Str. Bv. R. As. Soc. No. 61 (1912), p. 36. His No. 12061 from Ulu Semangkoh mentioned in the same paper has much thicker and differently-shaped leaves and is probably a new species.

20. *PASANIA EICHLERI*, Gamble. A large tree reaching 24—30 m. in height and 30—60 cm. in diam. of stem; branches spreading, crown sometimes low; branchlets stout, shining, with whitish-brown bark studded in places with large pale often elongate lenticels. *Leaves* thinly coriaceous; elliptic-oblong, oblong or oblong-lanceolate, caudate-acuminate at apex, acuminate at base; both surfaces dull and pale olive-brown when dry and covered, especially the lower, with very minute whitish pubescence; margins entire; 15—30 cm. long 5—8 cm. broad; midrib stout, prominent on both surfaces; main nerves 10—12 pairs, distant, prominent beneath, very oblique, starting at an angle of 35°—45° with the midrib, curving to and along the margin; transverse nervules irregular and indistinct as is the reticulation; petiole stout, 5—10 mm. long. *Spikes* up to 15 cm. long, axillary or in few-branched terminal panicles, ♂ ♀ or androgynous, sometimes with hermaphrodite flowers; rhachis much angled, grey-puberulous; bracteoles very small, ovate. *Flowers*: ♂ usually solitary; perianth nearly 2 mm. long, deeply cleft in 6 ovate acute puberulous lobes; stamens 12, filaments very long and slender, anthers small, ovate; pistillode small, pale brown-villous: ♀ also solitary, the cupule stout, perianth as in ♂; styles 3, very long, subulate, spreading, pubescent: ♀ with rather smaller perianth. *Fruits* in spikes 10—20 cm. long with a stout rhachis, pale and lenticellate like the branchlets; pedicels 0 or only 5 mm. long, stout; cupules thin with sharp edges, when young saucer-shaped and embracing one-half to nearly the whole of the acorn, when mature patelliform and nearly flat, 3—3.5 cm. in diam., and only embracing the base of the acorn, their edges free from it; lamellae 5—7, broad, flat, very minutely denticulate; acorn when young ovoid-conic with prominent umbo and the remains of the styles, minutely sericeous, when mature flattened depressed—turbinate sparsely sericeous becoming glabrescent, reaching 3 cm. in diam. and 1.5 cm. high, the basal attachment rather small, about 1 cm. in diam.; umbo small. *Quercus Eichleri*, Wenzig. in Jahrb. Bot. Gart. Berl. IV. 236 (1886); Hook f. Fl. Br. Ind. V. 615; King Ann. Calc. II. 72, t. 68.

PERAK: on low ground and up to about 500 m. alt. in dense forest, *King's Collector* 3875!, 4043!, 5290! 5570!, 6630!, 7289!, 7305!, 7384!, 8485!; at Assam Kumbong and Ralan Tujor, *Wray* 2577! 2607!.—DISTRIB: Sumatra (*Forbes* 3035!, 3183!, 3189!). Vern. 'Mempenung jantan,' 'Mempenung Putih' *Ridley*.

This species and *P. Curtisii*, Gamble, much resemble each other in leaves, but differ in other respects.

21. *PASANIA CLEMENTIANA*, Gamble. A tree; branchlets brown the younger ones black, bark with elongate lenticels. *Leaves* thinly coriaceous; oblong-lanceolate or oblanceolate, caudate-acuminate at apex, acutely attenuate at base; upper surface shining, olive-brown when dry, lower pale-brown dull; margins entire; 15–20 cm. long, 4–6 cm. broad; midrib stout, raised on both surfaces; main nerves 11–13 pairs, oblique, slender, at first nearly straight, curved to join in obscure arches close to the margin; transverse nervules rather distant, irregular, enclosing the areolate reticulation; petiole stout, about 1 cm. long. *Spikes*: ♂ (sometimes androgynous) under 10 cm. long, axillary and solitary or in terminal much branched panicles; rachis grey-puberulous, angled; bracteoles triangular, very small: ♀ solitary, axillary. *Flowers*: ♂ in clusters of about 4; perianth cup-shaped about 1 mm. long, lobes 6 obtuse; stamens 12, filaments slender, anthers reniform, small; pistillode rather large, densely whitish-villous: ♀ solitary or in threes, the young cupules truncate-pyriform with 4 broad distinct lamellae, quite enclosing the fruit. *Fruits* solitary or in threes of which 1 or 2 undeveloped; cupules when young obconic, when old sessile and saucer-shaped, enclosing half the acorn, thick (4 mm.), about 3 cm. in diam. and 1 cm. deep, the margins incurved; lamellae about 5, broad, the margins entire; acorns turbinate, flattened at base with a broad attachment, 2–2.5 cm. in diam., 1 cm. high, glabrous; umbo conical. *Quercus Clementiana*, King in Hook. f. Fl. Br. Ind. V. 614 (1888) and Ann. Calc. II. 69, t. 63 A.

PENANG: *Maingay* K.D. 1529!; on Government hill, *Curtis* 3095!  
PERAK: *Scortechini*!. MALACCA: at Sungei Udang, *Ridley*!.

22. *PASANIA OMALOKOS*, Schky in Engl. Bot. Jahrb. XLVII. 676 (1912). A large tree reaching a height of 24–30 m and 60–90 cm. in diam. of stem, branches spreading; branchlets brown, rough, longitudinally striate and lenticellate, the uppermost angular, grey-scurfy puberulous, bud-scales subulate-lanceolate. *Leaves* thinly coriaceous; elliptic-oblong or oblanceolate, abruptly and shortly obtusely acuminate at apex, cuneately attenuate at base; both surfaces glabrous and shining, dark green when fresh, olive-green when dry; margins entire; 5–13 cm. long, 2–4 cm. broad; midrib rather stout, raised on both surfaces; main nerves 15–20



pairs slightly prominent on both surfaces, nearly straight at first, joined near the margin by somewhat angular loops; transverse nervules irregular, reticulate and much branched, enclosing the areolate reticulation; petiole short, about 5 mm. long; stipules lanceolate, oblique. *Spikes* up to about 17 cm. long ♂ or androgynous, slender, grey puberulous, solitary and axillary or in sparse few-branched terminal panicles; rhachises slender, angled, bracts linear falcate, about 5 mm. long; bracteoles minute, ovate-acute. *Flowers*: ♂ in elongate clusters of usually 3—4, rarely solitary, perianth cup-shaped, very short, lobes 6, minute, incurved; stamens 12, filaments slender, anthers small; pistillode round, white-villous: ♀ not seen. *Fruits* usually solitary in spikes, about 10—12 cm. long with very stout rough rhachises; pedicel 0; cupules when young embracing nearly half the acorn, when mature only its base, saucer-shaped or flat, thick, the margins incurved, 2.5—3.5 cm. in diam. 6—7 mm. deep; lamellæ about 8—10, the lower ones broad and thick, the upper gradually narrower, all minutely tomentose, slightly undulate on the margins; acorns hemispheric or somewhat ovoid, glabrous except just round the umbo, shining, the base with wide circular intruded attachment, 1.5—2.5 cm. in diam., 1.5 cm. high: umbo small conical. *Quercus Omalokos*, Korth. Verh. Nat. Gesch. Bot. 214 (1839—42); Blume Mus. Bot. Lugd.-Bat. I. 301; Miq. Fl. Ind. Bat. I. i. 860 and Ann. Mus. Lugd.-Bat. I. 112; A. DC. Prodr. XVI. ii. 92; Wenzig in Jahrb. Bot. Gart. Berl. IV. 231; Hook f. Fl. Br. Ind. V. 614; King Ann. Calc. II. 70, t. 23 B. *Cyclobalanus Omalokos*, Oerst. in Kjoeb. Vidensk. Meddel. 80 (1866).

PERAK: in dense forest on the hills up to 1200 m. alt., Goping, Thaiping, etc. *King's Collector* 5950!, 6901!, 8194!, 8447!; *Scortechini*!. MALACCA: at Sungei Hudang, *Derry* 583!; *Goodenough* 1227!.—DISTRIB. Sumatra (*Korthals*!). Vern 'Mempenung putih' *Ridley*.

23. *PASANIA LUCIDA*, Gamble. A large tree reaching a height of 24—30 m. or more with 60—90 cm. in diam. of stem, branches spreading; branchlets stout, glabrous, dark purplish-brown to nearly black when dry with scattered elongate lenticels, prominently angled and usually furnished with raised lines decurrent from the leaf-axils; bud-scales ovate-acuminate more or less persistent. *Leaves* rigidly coriaceous; cuneately oblanceolate or oblong, obtusely rounded or emarginate at apex, acuminate or long-cuneate at base; both surfaces glabrous and shining, dark green when fresh, reddish-

brown when dry; margins entire, recurved; variable in size, 8—20 cm. long, 3—8 cm. broad; midrib very stout, raised on both surfaces; main nerves 10—20 pairs, not prominent, irregular, at first nearly straight, near the margin branching angularly and anastomosing, transverse nervules an irregular much branched reticulation; petiole stout, short, 5—10 mm. long, glabrous. *Spikes* up to 20 cm. long in close panicles terminal or axillary to the uppermost leaves, ♂ most numerous, ♀ apparently less numerous and solitary, androgynous very frequent the ♂ flowers above the ♀ below; rhachis slender, angular, grey-puberulous; bracts linear-subulate, nearly 1 cm. long, bracteoles ovate, 1 mm. long. *Flowers*: ♂ solitary or in clusters of usually 3 together; perianth cup-shaped, 1 mm. long, pubescent, lobes 6, broadly ovate; stamens 12, filaments long, anthers very small globular; pistillode large, pale, densely villous: ♀ solitary or in clusters of 2—3, cupule rather thick, perianth as in ♂ but smaller, styles small, conical. *Fruits* usually solitary in spikes of about 15 cm. long with very thick rhachises deeply pitted with the prominent scars of abortive flowers; pedicel 0; cupule when young embracing nearly the whole acorn, when mature only its base, 2.5—3.5 cm. in diam., 5 mm. deep, saucer-shaped or flat, grey tomentose, the base of the much intruded; lamellae 8—13, when young very thick, the inner ones much inflexed and very narrow, when mature narrower the margin slightly undulate; acorn hemispheric hardly depressed at apex, truncate at base with a very broad attachment, smooth shining, glabrous except sometimes around the minute conical umbo, 3—3.5 in. in diam. 15—20 mm. high; pericarp thick, woody; the endocarp intruded in plates, star-like, into the seed. *Quercus lucida*, Roxb. Fl. Ind. III. 635 (1832); Miq. Fl. Ind. Bat. I. i, 863 and Ann. Mus. Lugd.-Bat. I. 166; Hook. f. Fl. Br. Ind. V. 614; King. Ann. Calc. II. 69, t. 64. *Q. cuneata*, Herb. Roxb.; Wall. Cat. 3732.

PENANG: *Maingay* K.D. 1526!; *King's Collector* 1810!; half way up Penang Hill, *G. King*!; at Chalet, *Curtis* 930!. PERAK: generally on low ground and up to 150 m. alt., *King's Collector* 3990!, 5086!, 5279!, 5307!, 5325!, 5351!, 5429!, 5675! 5682!, 6198!, 6500!, 6914!; at lower camp, Gunong Batu Putih, 1000 m. alt., *Wray* 998!, 1190!, at Waterfall hill, 600 m. alt., *Wray* 2217!, at Selama, *Wray* 4177. SINGAPORE: *King's Collector* 1255!; at Teban, *Ridley*!; at Chenchu-Kang, *Ridley* 1603!; at Bukit Mandai, *Ridley* 3414a!; *Machado*!.

24. *PASANIA CYCLOPHORA*, Gamble. A very large tree reaching 30—40 m. in height and 60—120 cm. in diam. of stem, branches spreading; branchlets stout, smooth, angular, glabrous, purplish-brown when dry, sparsely lenticellate; bud-scales lanceolate, tawny-puberulous, nearly 1 cm. long. *Leaves* coriaceous; oblong or oblong-lanceolate, acuminate often caudately at apex, acuminate at base; upper surface glossy dark green when fresh, brown and shining when dry, when young sometimes lepidote, lower silvery grey when fresh, yellowish-glaucous when dry with dense minute pale tomentum; margins entire, recurved; 15—30 cm. long, 5—10 cm. broad; midrib very stout and prominent, raised on both surfaces; main nerves 16—20 pairs, conspicuous, parallel, oblique, slightly impressed above, slightly curved to and along the margin, the apical ones meeting in loops; transverse nervules very many, fairly regular and parallel but curved, joined by rather obscure smaller nervules; petiole stout, 1—2 cm. long, the upper end bordered by the decurrent margins of the blade; stipules ovate, tawny-puberulous, very caducous. *Spikes* about 10—12 cm. long, ♂ or androgynous, solitary or in small axillary or terminal panicles on the new branchlets; rhachis angular, minutely puberulous or subglabrous; bracts ovate acute; bracteoles ovate acuminate, very many, usually 1 to each ♂ and 2 to each ♀ flower. *Flowers*: ♂ solitary or in clusters of 2—4, perianth cup-shaped, puberulous, 1.5—2 mm. long, lobes 6, ovate, acute; stamens 12, filaments slender, anthers very small, globose; pistillode rather small, white-villous when dry: ♀ solitary, cup with appressed scales, perianth as in ♂ but lobes less acute; styles 3 small, conical. *Fruits* very large, sessile on a thick rhachis up to 12 cm. long; cupules very thick (to 1 cm.), saucer-shaped, embracing half the acorn, the margins rounded and incurved, 4.5—6 cm. in diam. 2—2.5 cm. high, minutely tomentose without; lamellae up to about 10, rounded, the margin wavy, indistinct and irregular; acorn flattened, much depressed at the top, broadly attached at base, densely and minutely furfuraceous-tomentose, about 4 cm. broad and 1.5 cm. high, the inner walls of the pericarp protruded within star-like through the testa and cotyledons of the seed; umbo in the depression, conspicuous, conical, about 6 mm. high. *Quercus cyclophora*, Endl. Gen. Pl. Suppl. IV. ii. 28 (1847); A. DC. Prodr. XV. ii. 102; Miq. Ann. Mus. Lugd.-Bat. I. 113; Hook f. Fl. Br. Ind. V. 615; King Ann. Calc. II. 71, t. 67. *Q. depressa*, Roxb. Fl. Ind. III. 640 (*not of* H. B. K. or of Bl.). *Q. placentaria* Wall. Cat. 2779 and 2779 B. *not of* Bl.; Hance in Journ. Bot. 364 (1875). *Q. penangensis*, Miq.

Fl. Ind. Bat. I. i. 859. *Q. umbonata*, Hance in Journ. Bot. 241 (1874), 364 (1875).

PENANG: *Wallich* 2779!; *Maingay* K.D. 1528!; *Norris*!; *G. King*!; *Curtis*! 361; *Stoliczka*!. PERAK: on hills in dense forest up to 1000 m. alt., *King's Collector* 2402!, 6821!, 6888!; at lower camp Gunong Batu Putih, *Wray* 1207!. SELANGOR: at 15th mile, Pahang track, *Ridley* 8503!. SINGAPORE: *Wallich* 2779B!; in Botanic Garden, *Hullett* 654!; at North Selitar, *Ridley* 115!.

25. *PASANIA COSTATA*, Gamble. A tree reaching a height of 18—24 m. and 60—90 cm. in diam. of stem, branches spreading; branchlets rather stout with smooth brown bark and small lenticels, the youngest slightly lepidote soon becoming glabrous; leaf-buds lanceolate with linear slightly falcate nearly glabrous scales about 1 cm. long. *Leaves* thickly coriaceous; elliptic-oblong or elliptic-lanceolate or -oblanceolate, abruptly caudate at apex, the acumen obtuse, acute or almost rounded at the base which is slightly decurrent on the petiole; upper surface bright green when fresh, olive-brown, shining and glabrous when dry, lower glaucescent, dull; margin entire, slightly recurved when dry; 10—20 cm. long, 4—7 cm. broad; midrib very stout, prominent on both surfaces; main nerves 10—14 pairs, indistinct, straight at first, then curving to meet in loops near the margin; transverse nervules irregular, distant, enclosing the minutely areolate reticulation which is conspicuous on both surfaces; petiole 7—17 mm. long. *Spikes* terminal or axillary, ♂ or ♀ or ♂ and ♀ together the latter the highest, minutely grey-puberulous: ♂ up to 25 cm. long, slender but stiff: ♀ about 15 cm. long, slender; bracteoles of ♂ conspicuous in bud, linear-subulate, 2—3 mm. long. *Flowers*: ♂ in clusters of usually 3, each cluster to a bracteole; perianth cup-shaped, 1 mm. long, cleft halfway down into 6—7 rounded lobes; stamens 12—15, filaments long, slender, anthers ovate apiculate; pistillode large, white-villous: ♀ solitary, distant, the cupule flattened on the rhachis, perianth-lobes as in ♂ but smaller; styles 3, very short. *Fruits* in stout spikes about 15 cm. long, distant, very large, 4.5 cm. in diam. when mature, 2.5 cm. high, very broadly turbinate, obliquely set on the very thick 1.5 cm. long pedicel which is ringed near the middle; rhachis like the branchlets; cupules when young embracing most of the acorn, turbinate and about 5-ringed, when mature obconic, minutely hoary, separate from the acorn but incurved over it for about 5 mm. at the top; lamellae 2, wide and

more or less oblique on the lower part, 3 closer together at the overlap; acorn patelliform, the exsert portion scutiform, slightly convex, chestnut-brown, shining, glabrous; umbo conical; walls of the pericarp very thick, at least 5 mm., the endocarp slightly protruded inwards in narrow plates. *Quercus costata*, Blume Bijdr. 522, Fl. Jav. Cupul. 25, t. 13, 14 and Mus. Bot. Lugd.-Bat. I. 301; Korth. Verh. Nat. Gesch. 212; A. DC. Prodr. XVI. ii. 93; Miq. Fl. Ind. Bat. I. i. 862, and Ann. Mus. Lugd.-Bat. I. 116; Wenzig in Jahrb. Bot. Gart. Berl. IV. 239; Hook. f. Fl. Br. Ind. V. 617; Koord. & Val. Bijdr. X. 60; King Ann. Calc. II. 81 t. 76 A; Koord. Exkurs. Fl. Jav. II. 70. *Lithocarpus scutigera*, Oudem. Annot. Crit. Cupul. Jav. 20, t. 12. *Cyclobalanus costata*, Oerst. Kjoeb. Vidensk. Meddel. 81 (1866).

PERAK: in hill forests up to 300 m. *King's Collector* 4891!, 5166!, 5584!, 5783!, 7277 (ripe fruit); *Scortechini*!.—DISTRIB. Java, Sumatra.

This species has usually been placed in Sect. LITHOCARPUS as believed to have the acorn completely attached to the cupule, but as after cutting through a good, quite ripe specimen I find this not to be the case, I have followed Oersted in transferring it to Sect. CYCLOBALANUS. King considers the Peninsular material to belong to Blume's var. *convexa*, but I cannot agree in this. Scortechini's specimens agree well with both Blumes' and Oudemans' figures, and the rest of the material differs only in having the fruit (much more mature) very broad and obconic instead of cylindrical. The thickness and hardness of the pericarp is most remarkable.

26. PASANIA LAMPADARIA, Gamble in Kew Bull. 177 (1914). A small tree; branchlets very stout with smooth dark-grey or nearly black bark, rough with dark rounded lenticels. *Leaves* very coriaceous; lanceolate, acuminate at apex with an oblique obtuse acumen, attenuate at base and more or less decurrent on the petiole; upper surface smooth, shining, lower whitish when fresh with a minute felted pubescence, grey when dry; margins entire, recurved; 20—25 cm. long, 6—10 cm. broad; midrib very thick and prominent; main nerves 12—14 pairs, at first nearly straight, curving to vanish along the margin; transverse nervules many, subparallel, slightly arched; reticulation obscure; petiole very stout, wrinkled, 1—1.5 cm. long, bordered partly by the decurrent margins of the blade. *Flowers* not known. *Fruits* (immature) sessile in stout spikes about 10 cm. long, usually 3 together, occasionally more, sometimes (the lower ones) single or in pairs; cupules enclosing about three-fourths of the half mature acorn; lamellae to each acorn about 5, minutely denticulate; acorns white-sericeous; umbo prominent, conical.

PERAK : at lower camp Gunong Batu Puteh, 1000 m. alt., Wray 1176! 'saplings used when dry as torches in fishing by Sakais'; camp on Ulu Batang Padang 1500 m. alt. Wray 1514!.

27. PASANIA BLUMEANA, Gamble. A tree reaching 12—15 m. in height, branches spreading; branchlets stout, greyish-brown, lenticellate, the ultimate ones shining, plumbeous, minutely pulverulent; resting-buds globose, the scales obtuse. *Leaves* coriaceous; elliptic-oblong or oblong-lanceolate, acuminate or cuspidate at apex, acute at base; upper surface glabrous, dull or shining, greyish-brown when dry, lower pale, very minutely stellate-tomentose; margin entire, recurved; 15—20 cm. long, 4—7 cm. broad; midrib stout, raised on both surfaces; main nerves 12—14 pairs, prominent beneath, parallel, straight at first, curving somewhat abruptly close to and along the margin; transverse nervules many, parallel; reticulation obscure; petiole very stout, 1—1.5 cm. long. *Spikes* usually ♂ or androgynous, slender, axillary or in terminal panicles; rhachis minutely grey-tomentose; bracteoles minute. *Flowers*: ♂ very small, solitary or in clusters of 3—4; perianth very short, lobes obtuse; stamens with very slender filaments and minute ovate anthers; pistillode grey-villous: ♀ solitary, the involucre scaly, perianth-lobes short; styles short, spreading. *Fruits* depressed-turbinate, solitary in dense spikes about 10—12 cm. long, the rhachis very stout, rough with prominent lenticels and lepidotepuberulous; pedicel stout, very short, about 5 mm. long; cupules thin, when very young produced above the ovary, in half-ripe specimens enclosing the whole acorn except the umbo, grey-pubescent and covered into prominent appressed or spreading subulate scales, when mature covering from two-thirds to nearly the whole of the acorn and splitting in vertical fissures, the scales in obscure rings; acorns depressed-turbinate till about half-ripe, when mature globose or hemispheric-conic, densely sericeous-tomentose, 1.5—2 cm. in diam. and 1—5 cm. high; umbo conical, surmounted by the persistent stigmas. *Quercus Blumeana*, Korth. Verh. Nat. Gesch. Bot. 208, t. 44 (1839—42); Bl. Mus. Bot. Lugd.-Bat. I. 288; A. DC. Prodr. XVI. ii. 103; Miq. Fl. Ind. Bat. I. i. 863 and Ann. Mus. Lugd.-Bat. I. 116; Wenzig in Jahrb. Bot. Gart. Berl. IV. 237; Hook. f. Fl. Br. Ind. V. 615; King Ann. Calc. II. 75, t. 69 B; Koord. & Val. Bijdr. X. 57; Koord. Exkurs. Fl. Jav. II. 69. *Cyclobalanus Blumeana*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PERAK: *Scortechini*!; in Larut, 1000—1200 m. alt., King's Collector 3232!.—DISTRIB.: Java, Sumatra, Borneo.



The leaves in the Peninsular specimens are considerably larger than those figured by Korthals, but in other respects Sir G. King's identifications seem correct.

28. *PASANIA CONFRAGOSA*, Gamble. A large tree reaching a height of 24—30 m. and 60—90 cm. in diam. of stem; branches spreading; branchlets stout, smooth, greyish-brown, with few but rather large lenticels, the youngest scurfy; leaf-buds ovoid with small narrow acute scales. *Leaves* very coriaceous; elliptic or elliptic-lanceolate, abruptly and obtusely cuspidate-acuminate at apex, acute at base; upper surface dark green when fresh, more or less shining when dry, smooth, lower greyish when fresh minutely greyish appressed-pubescent when dry; margins slightly recurved; 10—18 cm. long, 3—7.5 cm. broad; midrib stout, prominently raised on both surfaces; main nerves 6—8 pairs, raised beneath, curving gradually to and along the margin; transverse nervules many, subparallel, indistinct as is the reticulation; petiole stout, 10—12 mm. long. *Flowers* unknown. *Fruits* sessile, solitary, globose, in stout or somewhat slender terminal or axillary spikes up to 20 cm. long, the peduncle about 4—5 cm.; rhachis like the branchlets; when ripe up to 3.5 cm. in diam. and 3 cm. high; cupules when half-grown thin enveloping three-fourths or more of the acorn, rugosely reticulated with appressed ovate acute keeled scales of which only the apex of the upper ones is free, when mature thicker and enveloping the whole acorn except the umbo, the scales thickened into irregular coarse tubercles; acorn globose when young, when mature somewhat depressed, minutely velvety; umbo prominent, the stigmas persistent. *Quercus confragosa*, King in Hook. f. Fl. Br. Ind. V. 616 (1888) and in Ann. Calc. II. 77. t. 71.

PERAK: in forest on low hills up to 150 m. alt. *King's Collector* 8123!, 8188!.

This is a very remarkable species especially in the difference between the young and the mature cupules.

29. *PASANIA WRAYII*, Gamble. A tree, branchlets rather stout, pale, shining, the young ones densely and minutely fulvous-tomentose. *Leaves* subcoriaceous; oblong-lanceolate, long—caudate-acuminate at apex, acute or obtuse and often unequal at base; both surfaces dull, minutely stellate-puberulous especially on the midrib, lower paler; margins recurved when dry; 13—20 cm. long, 3—5 cm. broad; midrib prominent, raised on both surfaces; main nerves 12—16 pairs, prominent especially on the lower surface,

curved slightly to just within the margin and then suddenly bent parallel to it; transverse nervules many, arched, often branching, enclosing the minute reticulation; petiole stout, tomentose, 3—5 mm. long. *Flowers* not known. *Fruits* sessile, solitary in axillary dense spikes under 10 cm. long of which the peduncle about half that length and, with the rachis, fulvous-tomentose; cupule fulvous-tomentose, much depressed, 2 cm. in diam., 1 cm. high, when young almost discoid, enveloping the whole acorn and completely covered with stout simple at first incurved afterwards radiating rather soft spines which are usually hooked at the apex; acorn depressed, fulvous-sericeous. *Quercus Wrayii*, King in Ann. Roy. Bot. Gard. Calc. II. 77, t. 104 (1889).

PERAK: at Kota, Wray 2854!. PAHANG: at Telom, Ridley 13727!.

The description of the fruits is perforce taken from immature specimens.

30. *PASANIA DISCOCARPA*, Gamble. A large tree reaching 30—40 m. in height and up to 120 cm. in diam. of stem; branchlets purplish-brown with conspicuous large usually oblong lenticels; resting-buds small ovoid with ovate scales. *Leaves* coriaceous; lanceolate or oblong-lanceolate, long-acuminate and usually mucronate at apex, acute at base; upper surface glabrous, deep green when fresh olivaceous when dry, shining, lower paler and brown when fresh, with minute appressed cinnamomous pubescence; 8—16 cm. long, 3—5 cm. broad; midrib rather slender, slightly impressed above; main nerves 8—10 pairs, curving gradually to and along the margin, thin but prominent beneath; transverse nervules many, subregular, obscure as is the reticulation; petiole 5—8 mm. long. *Spikes* about 10 cm. long in erect terminal spreading tomentose panicles, lower ones many and ♂, the ♀ few and near the top of the panicles only; bracteoles minute, broad, obtuse, .5 mm. long, those of ♀ smaller and more acute. *Flowers*: ♂ very small in clusters of 2—4; perianth-lobes nearly free, ovate, about .7 mm. long, pubescent; stamens 12, filaments slender, anthers globose; pistillode of many separable villous scales: ♀ solitary; perianth-lobes very small; styles 3, subulate, spreading. *Fruit* sessile, hemispheric- or turbinate-conic, minutely tawny-pubescent, 1.5 cm. long, 2 cm. in diam.; cupule thin, completely enclosing the whole acorn except the umbo, concave at base and bearing scattered tufts or broken lines of simple or branching spreading pubescent sharp spines up to 8 mm. long; acorn minutely appressed-pubescent with retrorse

hairs, base very concave, umbo conical. *Quercus discocarpa*, Hance in Journ.-Bot. for 1874, 242; Hook. f. Fl. Br. Ind. V. 616; King Ann. Calc. II. 76, t. 70. *Castanopsis discocarpa*, Hance in Journ. Bot. for 1878, 201.

PENANG: at Penara Bukit, 300 m. alt., Curtis 1155!. PERAK: in open hilly forest at 250—450 m. alt., Larut, King's Collector 5482!; at Gunong Bubu, Scortechini 841!.—DISTRIB. Bangka (Teysmann), Borneo (Hallier).

31. *PASANIA ACUMINATISSIMA*, Oerst. in Kjoeb. Vidensk. Meddel. 84 (1866). A tree up to 25 m. in height and 1.5 m. in diam. of stem; branchlets nearly black, lenticellate, slender, the youngest minutely puberulous; leaf-buds globose with 2—3 subulate scales at base. Leaves coriaceous, lanceolate or ovate-lanceolate, long acuminate at apex the acumen somewhat obtuse, acute or somewhat rounded and often unequal at base; upper surface when dry ashy-grey, shining, glabrous, lower surface reddish-brown, glabrous or minutely rufous-pubescent; margin entire or the upper half coarsely serrate, the serrations at the ends of the main nerves, usually reflexed when dry; 4—12 cm. long, 2—3.5 cm. broad; midrib slender, very slightly impressed above; main nerves 8—11 pairs, prominent beneath; transverse nervules many, subprominent, enclosing the areolate minute reticulation; petiole 5—10 mm. long, somewhat flattened. Spikes from the axils of the upper leaves, erect, solitary but paniculately arranged: ♂ very slender, almost filiform, slightly puberulous, under 5 cm. long; bracteoles ovate-acuminate glabrous except the villous tip, 1—1.5 mm. long: ♀ stouter up to 6 cm. long; bracteoles as in ♂. Flowers: ♂ solitary in the axils of the bracteoles; perianth-lobes free, much imbricate, orbicular, nearly 1 mm. in diam., the margins ciliate; stamens 10—12 or more, filaments very short, anthers rather large; pistillode villous with 1—2 rudimentary ovaries and stigmas embedded in the hairs: ♀ also solitary, distant, the cupule scaly; perianth-lobes as in ♂ but smaller; stamens sometimes present; styles 2—3, spreading, subclavate. Fruits in spikes up to about 10 cm. long, rachises like the branchlets; cupules (immature) obliquely ovoid, closely enveloping the whole acorn except the umbo, minutely fulvous-puberulous without, villous within, bearing 4—5 rather oblique rings of stout sharp erect or recurved tubercular spines; 15—20 mm. long, 10—12 mm. in diam.; acorn ovoid-apiculate, flattened on one side; umbo rounded. *Q. acuminatissima*, A. DC. Prodr. XVI. ii. 102 (1869);

Koord. Exkurs. Fl. Jav. II. 69. *Q. Junghuhnii*, Miq. Fl. Ind. Bat. I. i. 853 (1855); Oudem. Annot. Crit. Cupul. Jav. 15, t. 9, Wenzig in Jahrb. Bot. Gart. Berl. IV. 237; King Ann. Calc. II. 78, t. 73. *Q. fagiformis*, Jungh. in Nat. Tijdschr. N. Ind. Ser. 3, IV. 119 (1857) and in Bonplandia VI. 82 with picture of stem and roots; Miq. l.c. 870; Koord. & Val. Bijdr. X. 54. *Q. lineata*, Miq. (not of Bl.) Pl. Jungh. I. 10. *Castanea acuminatissima*, Bl. Mus. Bot. Lugd.-Bat. I. 283 (1850); Miq. l.c. 867. *C. ? sessilifolia*, Bl. l.c. 284; Miq. l.c. 867.

PERAK: at Gunong Bubu, *Scortechini* 832!.—DISTRIB. Java, at high elevations (*Blume, Teysmann, De Vriese, Junghuhn Kurz, Forbes* 335, 941).

*Scortechini's* specimens have entire leaves, but agree well with the Java specimens, which have often the leaves entire; they were identified with this species tentatively by King in Hb. Calc., and I do not doubt the correctness of his opinion. The tree is described in most of the works on the Flora of Java as having many stems and as putting forth countless suckers from the roots. The picture in 'Bonplandia' shows these forming a kind of hut and sheltering the natives. *Scortechini* gives no information regarding the stem and roots of the Perak trees.

32. PASANIA ENCLEISACARPA, Gamble. A large tree reaching 24—30 m. in height and 60—90 cm. in diam. of stem, branches spreading; branchlets rather slender, dark greyish brown to nearly black, furrowed, smooth, youngest ones whitish-lepidote. Leaves chartaceous; elliptic or elliptic-oblong, abruptly caudate-acuminate at apex the acumen obtuse, acute at base; upper surface dark green when fresh, dark grey when dry, glabrous, shining or dull, lower silvery-grey when fresh, plumbeous when dry and sublepidote; margins entire; 10—17 cm. long, 4—6 cm. broad, sometimes smaller; midrib fairly strong, slightly raised on both surfaces; main nerves 7—9 pairs, boldly curving to and along the margin, the upper ones to meet in loops; transverse nervules few, distant, enclosing the areolate reticulation; petiole slender, 1 cm. long. Spikes: ♂ and ♀ usually separate, but sometimes androgynous the ♂ flowers above the ♀ below: ♂ slender, up to 20 cm. long or more, many together in lax terminal grey-pubescent panicles; bracteoles very small, ovate, acute: ♀ and androgynous nearly as long, axillary, solitary. Flowers: ♂ in somewhat elongate clusters, rarely of only 2—3; perianth cup-shaped, 1 mm. long, cleft about half way down in 6 slightly acute pubescent lobes; stamens 12, filaments slender, anthers ovoid; pistillode large, often oblong, very villous: ♀ soli-

tary or rarely 2—3 together, on a very stout upcurved flattened pedicel; cupule thick, faintly 2—4-annular; perianth as in ♂; ovary densely silky; styles 3, spreading. *Fruits* hemispheric, 2—3 cm. in diam., 1.5—2 cm. high, in stout spikes up to 20 cm. long; rhachis like the branchlets; enlarged pedicel very stout, 1—1.5 cm. long, obconical, flattened; cupule thin, smooth, chartaceous, reddish-brown when dry, enveloping the whole acorn except the umbo, the margin often split, with 4—5 faint wavy rings, which are again connected by obscure straight vertical lines; acorn densely white appressed-sericeous with retrorse hairs, the base deeply hollowed out, the apex broadly conical tipped with the remains of the stigmas; endocarp with intruded plates, the cotyledons thus presenting a shallow conic star-like figure of about 10 rays enveloping the conical intruded endocarp. *Quercus encleisacarpa*, Korth. in Verh. Nat. Gesch. Bot. 208, t. 45 (1839-42), Blume Mus. Bot. Lugd.-Bat. I. 288; A. DC. Prodr. XVI. ii. 103; Miq. Fl. Ind. Bat. I. i. 862 and Ann. Mus. Lugd.-Bat. I. 116; Wenzig in Jahrb. Bot. Gart. Berl. IV. 238; Hook. f. Fl. Br. Ind. V. 617; King Ann. Calc. II. 80, t. 75. *Cyclobalanus encleistacarpa*, Oerst. in Kjoeb. Vidensk. Meddel. 81 (1866).

PENANG: on Government Hill, *Curtis* 254!; in dense forest at 300 m. alt., *King's Collector* 1581!. PERAK: in forest up to about 300 m. alt., *King's Collector* 2828!, 5143! (small leaves 6—7 cm. by 2.5—3 cm.), 5477!, 5523!, 5594!, 5682!, 5689!, 5739!, 7541!; *Wray* 3291!. SELANGOR: at Rawang, *Ridley* 10474!. SUNGAI UJONG. MALACCA: *Derry* 1213!. SINGAPORE: *Cantley*!.—DISTRIB. Sumatra (*Korthals*, *Forbes* 2943!). Vern. 'Mempenung putih,' 'Berangan babi hutan' *Ridley*.

The Sumatra specimens have the fruit more conical and longer (2 cm. or more) than the Peninsular ones which are almost flat or only slightly conical at top.

Var. *aperta*, King in Hook. f. Fl. Br. Ind. V. 617. Acorn smaller more nearly globose, the cupule always open for the upper fourth, the diam. of the orifice 1.5 cm. in ripe or nearly ripe specimens, margin often thickened. King l.c.

PENANG: *Maingay* K.D. 1531!; Government Hill at 600 m. alt., *Curtis* 366!. PERAK: in forest on the hills up to 1200 m. alt., *King's Collector* 4855!, 8303!; *Scortechini*!.

33. PASANIA ROBINSONII, Gamble. A tree, branches stout,

dark-coloured. *Leaves* coriaceous; lanceolate, acuminate, acute at apex, narrowed and cuneate at base; upper surface brown when dry, lower silvery except the brown nerves; 15 cm. long, 5 cm. wide; main nerves 11 pairs, raised beneath; transverse nervules parallel. *Spikes* in erect racemes, numerous, terminal, 8 cm. long, on branches 12 cm. long; base 3 mm. long; rhachis scurfy. *Flowers*: ♂ sessile; perianth lobes 6, short, dentiform, acute, pubescent; stamens 12, anthers ellipsoid; pistillode pulvinate, silky; bracts very small: ♀ on separate spikes; styles 3, short. *Fruit* when young with the cupule covering the acorn and covered with short appressed triangular scales, when mature the cupule thin, free from the acorn except at base and covering all but the umbo, splitting at the top into 5 irregular lobes, pubescent, faintly vertically ribbed but without rings, 1.5 cm. long; acorn rather longer, ovoid, tapering at apex, silky; umbo short with 3 persistent styles. *Quercus Robinsonii*, Ridley in Journ. Fed. Mal. States V. 46 (1914).

SELANGOR: Gunong Mengkuang Lebah, 1500—1700 m. alt., Dyak Collector of the States Museum.

I have seen no specimens, the description is taken from Ridley's.

34. PASANIA MAINGAYII, Schky in Engl. Bot. Jahrb. XLVII. 627 (1912). A very large tree; branchlets fulvous with pale lenticels, young branchlets and inflorescence minutely fulvous-tomentose. *Leaves* coriaceous; elliptic-oblong or obovate-oblong, shortly acuminate at apex, cuneately acute at base; upper surface olive-brown when dry, minutely lepidote pubescent on the midrib and nerves otherwise nearly glabrous, under surface covered with very minute pale fulvous stellate pubescence; margin entire; 20—25 cm. long, 7—15 cm. broad; midrib rather stout, prominent on both surfaces; main nerves 15—20 pairs slightly raised above, slightly curving to within the margin and then sharply bent to join in intramarginal loops; transverse nervules many, subparallel, often branched, more distinct on the upper than on the lower surface, and enclosing the minutely areolate reticulation; petiole stout, 2.5—3 cm. long, minutely tomentose, bordered above by the decurrent margins of the blade. *Spikes*: ♂ about 12 cm. long, very slender: ♀ solitary, 16 cm. long or more. *Flowers*: ♂ in elongate rather distant clusters on the fulvous-tomentose rhachis; bracteoles very small, lanceolate, acute; perianth cup-shaped, 1—1.25 mm. long, cleft nearly to the base in almost lanceolate villous lobes; stamens 12, filaments slender, anthers globose; pistillode usually elongate, very villous:



♀ solitary; cupule covered with minute scales arranged in lamellae; perianth as in ♂ but much smaller; styles minute. *Fruits* in thick racemes, 10—15 cm. long; narrowly pyriform with truncate umbonate apex, 3.5 cm. long, 2—4 cm. in diam.; pedicel thick, erect, nearly 1 cm. long; cupules woody, embracing the whole acorn and adherent to it except at the top, smooth and minutely tomentose with about 3—6 obscure oblique lamellae; acorn confluent with the inner walls of the cupule, the flattened top sericeous; umbo small, exsert; pericarp hard, corky, about 5 mm. thick, endocarp walls slightly intruded in narrow plates. *Quercus Maingayii*, Benth. in Hook. Ic. Pl. t. 1314 (1880); Hook. f. Fl. Br. Ind. V. 617; King Ann. Calc. II. 82 t. 77.

PENANG: *Maingay* K.D. 1464!; *Curtis* 267!. SELANGOR: 15th mile, Pahang track, *Ridley* 8588!.

*Wray* 1142! from Lower Camp, Gunong Batu Putih, resembles this very closely in its branchlets and leaves, the only noticeable difference being that there are more main nerves. The fruits, however, of which there are only very young specimens, are in clusters of 1—3, more usually one or two abortive, but all connected and having cupules with irregular wavy hardened lamellae, while in *P. Maingayii* the fruits seem to be always solitary.

*Wray* 1097! also from Lower Camp, Gunong Batu Putih, consists of branchlets with ♀ flowers in terminal panicles of spikes and a few very young conspicuously lamellate fruits. It may perhaps, as suggested by Sir G. King, belong to *P. Javensis*, (Bl.) Prantl with which it agrees fairly well in leaves.

35. *PASANIA BECCARIANA*, Prantl. in Engl. & Prantl. Naturl. Pflanzenfam. III. i. 55 (1888). A tree, reaching 18—21 m. in height; branchlets slender, brown, the young ones minutely fulvous-puberulous; bud-scales lanceolate about 3 mm. long. *Leaves* subcoriaceous; lanceolate or narrowly elliptic, obtusely acuminate at apex, acuminate at base; upper surface glabrous, shining, lower pale greyish-brown, minutely hoary-pubescent; margin entire; 6—9 cm. long, 2—3 cm. broad; midrib slender, raised above; main nerves 8—10 pairs, curving gradually at first, more sharply close to the margin which they follow; transverse nervules many, obscure as in the reticulation; petiole slender, 1—1.5 cm. long. *Spikes* solitary from the upper leaf-axils forming a few-branched apparently terminal panicle, ♂ up to 7, ♀ to 6 cm. long. *Flowers*: ♂ very small, in clusters in the axil of an ovate pubescent bracteole; perianth-lobes 5—6, ovate acute; stamens 10—12 with very slender filaments and ovoid anthers; pistillode white-villous: ♀ (rather old) with a subcylindric about 8-ringed involucre; perianth very small; styles 3, short. *Fruit*

ovoid or obovoid, up to 7 cm. long, 4 cm. in diam., in short spikes with a stout fulvous-puberulous rhachis; cupules woody, thick-walled, closely enveloping the whole acorn except the styles and partly adnate to it, ringed externally with 5—7 prominent rings joined by many obscure longitudinal lines; acorn ovoid with very hard pericarp. *Quercus Beccariana*, Benth. in Hook. Ic. Plant. t. 1315 (1880); Hook. f. Fl. Br. Ind. V. 617; King Ann. Calc. II. 83, t. 78.

SINGAPORE: *Murton* 61! "abundant, the wood very brittle and useless."—DISTRIB. Borneo (*Beccari* 3310!).

### 3. CASTANOPSIS, Spach.

Trees, rarely shrubs, deciduous or evergreen. *Leaves* entire toothed or lobed. *Flowers* monœcious, in erect spikes, bracts small; spikes usually either ♂ or ♀ only, sometimes androgynous. *Perianth* cup-shaped, lobes usually 6. *Stamens* usually 12, sometimes less, at the base of the perianth-cup, filaments slender; anthers small, ovate or globose. *Pistillode* in ♂ flowers a villous cushion. *Ovary* after fertilization 3-celled; ovules 2 in each cell; styles 3, cylindric, stigma a terminal pore as in *Pasania*. *Fruit* of 1—4 ovoid or plano-convex nuts covered by the closed fruiting involucre (cupule) and sometimes (when 1 nut) adnate to it, the involucre irregularly dehiscent and covered in more or less cyclic arrangement with clusters of spines or tubercles; pericarp of nuts where free from the involucre coriaceous. *Seeds* usually 1 to each nut.—DISTRIB. One species in N. America, the rest of tropical or sub-tropical Asia.

Nuts usually 3, not adherent to the cupule.

Fruit-cupules more or less covered with spines.

Spines of the fruit 1 cm. long or more, needle-like, hairy, in dense tufts covering very nearly the whole cupule and concealing its surface.

Spines shortly strigose-hairy; leaves ovate, under 10 cm. long, 4 cm. broad, minutely tawny puberulous beneath .. ..

1. *C. malaccensis*.

Spines with long shaggy hairs; leaves elliptic, usually over 10 cm. long, 4 cm. broad, densely ferruginous-pubescent beneath .. ..

2. *C. Scortechinii*.

Spines of the fruit at most 1 cm. long, subulate, minutely tawny-pubescent, in scattered tufts or rough lines covering the cupule partly.

Nuts usually 3, spines about 5 mm. long in

- tufts not clearly arranged in rings but usually stalked; leaves beneath furfuraceous-villous; branchlets hardly lenticellate
- Nuts usually 1, spines 6—10 mm. long in tufts arranged in rings and not stalked; leaves beneath scaly and stellate-pubescent; branchlets prominently lenticellate.
- Spines stout, flattened, curved, under 1 cm. long, covering most of the cupule; fruits globose or double-globose, broader than long.
- Spines very numerous, fairly slender; leaves very large, over 40 cm. long, 12 cm. broad.
- Spines rather scanty, very stout; leaves small, under 16 cm. long, 6 cm. broad ..
- Fruit cupules without spines but bearing short pyramidal tubercles.
- Tubercles sharp when dry, 3—3.5 mm. high; leaves coriaceous, more or less elliptic, under-surface rufous-puberulous ..
- Tubercles not sharp, scarcely 1 mm. high; leaves chartaceous, more or less lanceolate, under-surface glabrous ..
- Nut 1, adherent within to the cupule.
- Fruit cupules covered with sharp subulate spines; spines staghorn-like in tufts on the top of thick stalks.
- Fruits globose, 5—6 cm. in diam.; spines 10—15 mm. long, the tufts regular except a bare patch on the inner side; leaves large, oblong or elliptic, tawny-velvety beneath ..
- Fruits oblong or globose, 2—3 cm. in diam.; spines 8—10 mm. long, the tufts often in oblique bands, no bare patch; leaves rather small, lanceolate, somewhat glaucescent beneath ..
- Fruit-cupules covered on the outer surface with stout flat triangular spines 7—9 mm. long; fruits obovoid-hemispheric, bare on the inner surface; leaves small, lanceolate, ashy- or tawny-pubescent beneath ..
- Fruit-cupules with no or only short tubercles, flattened on inner side.
- Fruits obovoid, 2.5 cm. in diam.; tubercles short, pyramidal, in transverse ridges; leaves elliptic, under-surface minutely pubescent ..
- Fruits pyriform, 2.5 cm. in diam.; tubercles none, only short vertical ridges; leaves lanceolate, under-surface only pubescent on midrib ..
3. *C. fulva*.
4. *C. costata*.
5. *C. catappaeifolia*.
6. *C. Andersoni*.
7. *C. Hullettii*.
8. *C. sumatrana*.
9. *C. megacarpa*.
10. *C. Ridleyi*.
11. *C. Wallichii*.
12. *C. nephelioides*.
13. *C. Curtisii*.

1. *CASTANOPSIS MALACCENSIS*, Gamble in Kew Bull. 178 (1914).

A tree; branchlets slender with dark brown bark scarcely at all lenticellate ultimate ones tawny-pubescent; leaf-buds small, ovoid, the scales ovate-acute. *Leaves* thinly coriaceous; ovate or lanceolate, acuminate and usually mucronate at apex, rounded, often unequally at base; upper surface scaly-puberulous when quite young, afterwards glabrous, olive-green when dry, lower surface minutely tawny-puberulous; margin entire; 5–10 cm. long, 3–4 cm. broad; midrib slender, impressed above; main nerves 8–10 pairs, curved to and along the margin where they disappear in small loops; transverse nervules very many and close enclosing the areolate reticulation and with it conspicuous on the upper surface when dry; petiole slender, 8–10 mm. long. *Spikes* and *flowers* not known. *Fruits* (immature) globose, 1.5–2 cm. in diam., in slender axillary spikes up to 10 cm. long, rhachis under 3 mm. in diam.; cupule thin, densely and almost completely covered with tufts of spreading straight pubescent needle-like spines 1–1.5 cm. long, the spines rarely branched, geniculate at base and covered except the extreme tips with short strigose tawny hairs; nuts usually 3, silky.

MALACCA: *Maingay* K.D. 1461!; at Brisu, *Derry* 947!.

*Maingay's* specimens in Herb. Calcutt. have the fruits of *Pasania sundaica* in an envelope attached.

2. *CASTANOPSIS SCORTECHINII*, Gamble in Kew Bull. 178 (1914).

A tree; branchlets stout, with grey rough bark, conspicuously furfuraceous-puberulous especially the ultimate ones; leaf buds ovoid, the scales lanceolate, acuminate, spreading, about 5 mm. long. *Leaves* subcoriaceous; elliptic or slightly oblanceolate, cuspidate-acuminate at apex, acute at base; upper surface glabrous except the midrib, olive-brown when dry, lower thickly ferruginous-pubescent; margin entire; 8–12 cm. long, 3–5 cm. broad; midrib slender, slightly raised and minutely puberulous on the upper, more prominent and pubescent on the lower surface; main nerves 12–15 pairs, slender and slightly impressed above, little curved at first more so close to the margin where they disappear along it; transverse nervules fairly numerous, rather irregular, reticulation obscure; petiole stout, very short, ferruginous-pubescent, 5 mm. long. *Spikes*: ♂ not known: ♀ about 15 cm. long axillary and lateral on upper branchlets; rhachis grey and furfuraceous-pubescent; bracteoles short, obtuse. *Flowers*: ♀ usually, only surrounded by a short cup of bracteoles. *Fruits* globose about

2 cm. in diam., rhachis of spike scarcely thickened; cupule densely covered with tufts of branching staghorn-like very sharp spines up to 12 mm. long, the spines covered with long shaggy ferruginous hairs.

PERAK: (without locality or number) *Scortechini* !.

3. *CASTANOPSIS FULVA*, Gamble in Kew Bull. 179 (1914). A tree reaching 18—24 m. in height and 45—60 cm. in diam. of stem, branches spreading; branchlets stout, dark purplish brown, covered, especially when young, with dense fulvous tomentum, hardly lenticellate; buds ovoid, the scales ovate, acuminate, tomentose. *Leaves* coriaceous; elliptic or sometimes elliptic-oblong, shortly and abruptly acuminate at apex, acute or somewhat rounded at base; upper surface bright green when fresh, bright brown shining and glabrous when dry, lower 'speckled brown and grey' when fresh, strigosely furfuraceous-villous and fulvous when dry; margin thickened, recurved; 8—16 cm. long, 3—7 cm. broad; midrib stout, impressed above, fulvous-tomentose when dry; main nerves 12—16 pairs, parallel, starting nearly at right angles with the midrib and slightly curving to the margin and there breaking up into diminishing loops; transverse nervules not prominent, rather irregular; petiole 12—20 mm. long, fulvous-tomentose. *Spikes*: ♂ not known: ♀ up to 18 cm. long, the rhachis grey-tomentose; bracts lanceolate. *Flowers*: ♀ 1—4 but usually in threes, surrounded by an involucre of many grey-tomentose ovate-lanceolate imbricate scales; perianth densely grey-tomentose; styles short spreading. *Fruits* globose, 2—2.5 cm. in diam. in spikes up to about 20 cm. long; cupule thin, more or less densely covered with fascicles of curved or staghorn-shaped sharp spines which are flattened and grooved and tawny-villous except the points and about 5 mm. long, the fascicles usually on stout stalks; nuts 1—4, usually 3, separating from the cupule, the pericarp sericeous villous; umbo rather large.

PERAK: in dense forest on low hills at 90—150 m. alt., Batang Padang, *King's Collector* 7751 !. SELANGOR: at Sungei Buloh, Vern. 'Kertak Tanga' *Mohammed Hashim* for *A. M. Burn-Murdoch* 38 !.

Sir George King identified the Perak specimens with *C. Hystrix*, but with some doubt. The same doubt is also expressed by a ? in the Fl. Br. Ind. I cannot think that they can be anything but quite distinct from any form of *C. Hystrix* and have no hesitation in describing the new species.

4. *CASTANOPSIS COSTATA*, A. DC. Prodr. XVI. ii. 110 (1864).

A fine tree reaching 12—15 m. in height and 60—70 cm. in diam. of stem, branches spreading; branchlets stout, glabrous when old, minutely tawny-pubescent when young; bark greyish-brown to nearly black, prominently studded with large pale lenticels; buds globose, 5 mm. in diam., the scales ovate, obtuse, grey-tomentose. *Leaves* chartaceous or subcoriaceous; elliptic or elliptic-oblong, shortly and often abruptly acuminate at apex, acute or rounded at base; upper surface bright green when fresh, olive-green when dry, glabrous above except the midrib, lower reddish-brown when fresh, also when dry, covered with minute fulvous scales and stellate pubescence; margin slightly recurved; 8—16 cm. long, 3.5—7 cm. broad; midrib moderately stout, raised and dark-tomentose on the upper, raised on the lower surface; main nerves 12—16 pairs, subparallel, impressed above, slightly curved at first, more abruptly so near the margin; transverse nervules many, obscure; reticulation scarcely visible; petiole 10—15 mm long, thickened at base. *Spikes* slender, 10—20 cm. long, the ♀ usually above the ♂ below, in loose terminal or axillary tawny-pubescent panicles; bracteoles ovate-acuminate, about 2 mm. long. *Flowers*: ♂ solitary or in rather distant clusters on the rhachis; perianth tawny villous, cut nearly to the base, the lobes acute; stamens with slender filaments; pistillode densely villous: ♀ usually in threes surrounded by an involucre of soft scales; perianth as in ♂; staminodes like minute stamens, usually 12; styles 3, short, spreading. *Fruit* globose, slightly depressed, 2—3 cm. in diam., in dense spicate clusters up to about 10 cm. long; cupules thin, covered, in more or less concentric rings, with fascicles of straight or curved sharp grooved, often flattened spines which are hardly subdivided and not on stalks, and about 6—10 mm. long; nut usually solitary, the pericarp densely fulvous-sericeous; umbo prominent. *Miq. Ann. Mus. Lugd.-Bat. I. 120*; *Scheff. Obs. Phyt. II. 50* (var. *bancana*). *C. trisperma*, *Scheff. l.c. Castanea costata*, *Blume Mus. Bot. Lugd.-Bat. I. 284*; *Miq. Fl. Ind. Bat. I. i. 866*.

PERAK: at elevations up to 1500 m. alt., *King's Collector 2909!*, 3651!, 6975!; at Thaipeng, Vern. 'Buah Brangan', *Wray* (fruits edible); *Scortechini!*.—DISTRIB. Java, Sumatra, Bangka.

Sir G. King in his Monograph, and in the Flora of British India and Koorders. *Exkurs. Fl. Jav.* all put this under *C. javanica*, but in my opinion the fruit of the two species is so distinct that they must be kept separate.

5. *CASTANOPSIS CATAPPAEFOLIA*, King in Hook. f. *Fl. Br. Ind.*



V. 621 (1888). A large tree reaching 18—24 m. in height and 40—50 cm. in diam. of stem, branches spreading; branchlets very stout, dark brown to nearly black with small inconspicuous lenticels, ultimate ones when young furfuraceous-puberulous; leaf buds large, perulate, the scales lanceolate 1—1.5 cm. long, stiff, nearly glabrous. *Leaves* coriaceous, very large; oblanceolate, acute at apex, gradually narrowed, almost cuneately, at base; upper surface glabrous except on the midrib and nerves, shining, lower dull, very minutely puberulous; margin entire; 40—50 cm. long, 12—20 cm. broad; midrib very stout, raised and puberulous on both surfaces; main nerves about 25—30 pairs, impressed keeled and puberulous above, very prominent beneath, parallel, starting nearly at right angles with the midrib and only slightly curving to near the margin and then somewhat abruptly to join each other in loops; transverse nervules rather few but prominent, again transversely joined and enclosing the rather obscure reticulation; petiole very stout, rugose, 10—15 mm. long. *Spikes*: ♂ not known: ♀ 25—30 cm. long, stout, with black angular rhachis minutely puberulous. *Flowers*: ♀ usually 3 together in the axil of an obtuse bracteole enclosing a cup of smaller bracteoles; perianth very small; styles 3, short, spreading, slender. *Fruits* globose or double-globose and then each half about 4 cm. in diam., minutely fulvous-puberulous, sessile, in spikes with a very stout rhachis; cupule thin, crustaceous, when double splitting vertically, covered externally with closely packed tufts of simple, subulate, flattened, striate, very sharp spines about 7 mm. long, the tufts in obscure oblique bands, the inner face more or less free; nuts 1—3, of which one usually small and empty, the good ones ovoid-globose, densely tawny-sericeous except the rather small rugose glabrous base, 2—2.5 cm. long. King Ann. Calc. II. 100, t. 92.

PERAK: in open forest on low hills at 100—150 m. alt., *King's Collector* 8137 !.

6. *CASTANOPSIS ANDERSONI*, Gamble in Kew Bull. 179 (1914). A tree; branchlets moderately stout with greyish-brown bark, the ultimate ones brown, minutely fulvous-pubescent; leafbuds globose, perulate, glabrous, the scales ovate, acute or acuminate. *Leaves* thinly coriaceous; obovate or oblanceolate or elliptic-oblong, acute at apex, acutely attenuate at base; glabrous, upper surface when dry shining, olive-brown, lower dull reddish-brown; margin entire, slightly recurved; 8—16 cm. long, 3—6 cm. broad; midrib slender,

raised on both surfaces; main nerves 10—15 pairs, slightly raised on both surfaces, curved to and along the margin and then ending in small diminishing loops; transverse nervules obscure, subparallel, enclosing the areolate reticulation; petiole slender, 1.5—2.5 cm. long. *Spikes*: ♂ slender, up to 20 cm. long in axillary or terminal panicles; rhachises fulvous-puberulous: ♀ not seen. *Flowers*: ♂ solitary or in few-flowered clusters; bracteoles ovate, acute, 1 mm. long; perianth-lobes 6, nearly free, ovate, acute or obtuse, villous, ciliate on the margins, 1 mm. long; stamens 12 with long filaments and very small globose anthers; pistillode very villous, often obscurely 3-lobed. *Fruits* sessile, globose or double-globose and then transversely elongate, obscurely 4-channelled, in stout spikes about 15 cm. long, the rhachises 5 mm. thick or more; 2.5 cm. high, 3.5 cm. long, 2 cm. broad; cupules thick-walled, studded scantily with clusters of subulate, simply or slightly branched, fulvous-puberulous curved, flattened, striate, sharp spines 5—10 mm. long when ripe; nuts 3 of which or 2 sometimes empty, ovoid-complanate, densely rufous-sericeous except the rugose base.

MALACCA: at Sungei Hudang, *Goodenough* 1593!. SINGAPORE: *T. Anderson* 85!; *Kurz*!; *Hullett* 74!; at Changi, *Ridley* 3388!, at Tanglin, *Ridley* 3389!, in garden jungle *Ridley* 10162!, 11353!.

This species comes very near to *O. Schefferiana*, Hance in Journ. Bot. 200 (1878); King l.c. 105. t. 99 but the leaves are longer, have more main nerves and a longer petiole and the spines on the fruit are at least twice as long.

7. *CASTANOPSIS HULLETTII*, King in Hook. f. Fl. Br. Ind. V. 623 (1888). A large tree, reaching 18—24 m. in height and 60—90 cm. in diam. of stem, branches spreading; branchlets stout with dark brown or nearly black bark and large prominent usually elongate lenticels, ultimate ones minutely scurfy, fulvous-tomentose; leafbuds ovoid, perulate, the scales ovate acute, fulvous-tomentose. *Leaves* coriaceous; elliptic or elliptic-lanceolate or oblong-lanceolate, acute acuminate or very shortly cuspidate at apex, acute or rounded and often unequal at base; upper surface glabrous, shining, dark green when fresh, olive-green when dry, lower surface dull, rufous and very minutely puberulous; margin entire, hard and recurved; 12—24 cm. long, 5—11 cm. broad; midrib stout, prominent on both surfaces; main nerves 15—18 pairs, prominent beneath, parallel, curved to and along the margin where they vanish; transverse nervules rather scanty, arched and irregular, rather obscure as is the reticulation; petiole 2—3 cm. long, swollen and rugose below,

bordered above by the decurrent margins of the blade. *Spikes* rather slender, up to 15 cm. long, in axillary or terminal many-branched fulvous-tomentose panicles, ♂ many, ♀ fewer, usually from axillary branches, some androgynous. *Flowers*: ♂ in round or elongated clusters of up to 5; bracteole ovate acuminate, 1.5 mm. long; perianth-lobes 6, nearly free, irregular but usually ovate acute, villous, scarcely 1 mm. long; stamens 12 with long usually twisted filaments and very small globose anthers; pistillode thick, villous: ♀ in groups of 3 with one outer bracteole as in ♂ and many smaller in a cup; perianth-lobes as in ♂ but smaller; styles 3, short, conical. *Fruits* sessile when ripe, very shortly thickly pedicelled when young, in dense woody spikes up to 15 cm. long, the rhachis very stout, 1 cm. in diam.; cupules when young depressed-globose with 3—4 vertical channels and between them studded with groups of short pyramidal sharp tubercles; when mature depressed-obovoid, minutely fulvous-tomentose, usually constricted by shallow channels, 3 cm. high, 4—4.5 cm. long, 3—3.5 cm. thick, the umbo prominent; between the channels about 4—6 curved more or less horizontal but oblique raised ridges studded with many sharp pyramidal tubercles 3—3.5 mm. high; dehiscing to near the base in 3—4 unequal valves; nuts 2—4, hemispheric-complanate, nearly 2 cm. high, the upper part chestnut-brown, shining, sparsely covered with retrorse fulvous hairs, the base rugose, dull, glabrous. King in Ann. Calc. II. 104, t. 98.

PENANG: in forest up to 600 m. alt., *King's Collector* (Kunstler) 1672!, 2266!, 4844!, 4909!, 5261!; on Government Hill, 300 m. alt., *Curtis* 419!; *Ridley*!. PERAK: in open forest up to 300 m. alt., *King's Collector* 5261!, 7753!; *Scortechini*!. MALACCA: *Main-gay* K.D. 1459!, 1462!, 1463!; at Merliman and Sungei Hudang, *Derry* 466!; at Bukit Bruang, *Goodenough* 1344!. SINGAPORE: *Hullett* 78!; *T. Anderson* 191!; *Kurz*!; *King's Collector* 238!, 1216!; *Cantley* 49!; *Ridley* in various places, 3392!, 3861!, 4682!, 5199!, 14143!. Vern. 'Berangan Papan' (*Ridley*).

8. *CASTANOPSIS SUMATRANA*, A. DC. in Seem. Journ. Bot. for 1863, 182. A large tree reaching 24—30 m. in height and 60—90 cm. in diam. of stem, branches spreading; branchlets stout, dark brown with many prominent pale lenticels, the ultimate ones glabrous or scantily and deciduously puberulous; leafbuds lanceolate, perulate, the scales lanceolate, spreading. *Leaves* chartaceous or thinly coriaceous, very variable in size; oblong-lanceolate or -oblan-

ceolate, sometimes elliptic-oblong, shortly acuminate at apex, or sometimes nearly obtuse, acuminate acute or almost rounded at base; dark green when fresh, olive-green when dry, glabrous on both surfaces; margins entire; 8—25 cm. long, 3—10 cm. broad; midrib moderately stout, raised on both surfaces; main nerves 12—20 pairs, thin but prominent and raised on both surfaces, curving slightly to near the margin then rather abruptly to break up along it in small loops; transverse nervules very many, often branched or irregular, enclosing the areolate reticulation; petiole 1.5—2 cm. long, swollen at base. *Spikes* slender, about 10—15 cm. long, cinereous-pubescent, in long-peduncled terminal or axillary panicles, ♂ very many, ♀ few, some androgynous the ♀ below the ♂ above, sometimes the ♀ from the past year's wood with stout rachises, showing late development. *Flowers*: ♂ solitary or in clusters of few together; bracteole small, ovate, obtuse; perianth-lobes 6, free, ovate-obtuse, very small, villous; stamens 12, with slender filaments and minute globose anthers; pistillode very villous, pale, sometimes small: ♀ in groups of usually 3, bracteoles 1 or more as in ♂; perianth as in ♂ but even smaller; staminodes like minute stamens; styles 3, spreading, villous at base. *Fruits* in thick woody spikes reaching to 20 and even 25 cm. long, when quite young depressed globose with prominent tubercles and more or less pedicelled, when older more or less lobed and constricted, the tubercles flatter, the pedicel less, when mature obovoid or globose, almost sessile, usually slightly constricted in 2—3 lobes, up to 2 cm. high, 3 cm. long and 2—2.5 cm. broad; cupule thick-walled, brittle, minutely grey-pubescent, bearing externally 3—5 irregular transverse rows or groups of short pyramidal tubercles, dehiscence irregular or not at all; ripe nuts 1—3, when 1 ovoid, when more ovoid-complanate, appressed sericeous except the rugose base which occupies one-third of the whole. A. DC. Prodr. XVI. ii. 113; Hook f. Fl. Br. Ind. V. 623; King Ann. Calc. II. 103, t. 97; Brandis Ind. Trees 635. *Castanea inermis*, Lindl. in Wall. Pl. As. Rar. ii. 6; Cat. 2762; A. DC. l.c. 116; Kurz For. Fl. ii. 481. *C. glomerata*, Blume Mus. Bot. Lugd.-Bat. I. 283. *Quercus?* *glomerata*, Wall. Cat. 2791 (not of Roxb.). *Callaeocarpus sumatrana*, Miq. Pl. Jungh. 13, Fl. Ind. Bat. I. i. 868, Suppl. 353 and Ann. Mus. Lugd.-Bat. I. 118.

PENANG: Wallich 2791!; Curtis 1563!, 2968!; King's Collector 1624!. PERAK: Scortechini 167!; at Gapis, Vern. 'Buah Brangan,' Wray 811!; at Batu Togoh, 60 m. alt. Wray 2168!; at various

places and at various elevations up to 300 m., *King's Collector* 2041!, 2299!, 2586!, 3098!, 3788!, 4495!, 4695!, 4835!, 5382!, 5462!, 5510!, 5812!, 5941!, 6782!, 7378!, 7971!, 10301!, 10903!. MAL-ACCA: *Griffith* K.D. 4442!, 4470!; *Maingay* K.D. 1457!; at *Brisu*, *Derry* 28!. SINGAPORE: *Ayer Panas*, *Wallich* 2762!.—DISTRIB. Burma, Sumatra, Lingya, Borneo.

9. *CASTANOPSIS MEGACARPA*, Gamble in Kew Bull. 180 (1914). A large tree reaching 12—18 m. in height and 60—90 cm. in diam. of stem; branches spreading, pendulous; branchlets moderately stout with dark brown bark and very small lenticels; uppermost ones minutely tawny velvety; leaf-buds ovoid, the scales lanceolate, tawny-velvety. *Leaves* coriaceous; oblong or elliptic-oblong or elliptic, shortly cuspidate-acuminate at apex, acute or rounded sometimes unequally at base; upper surface glabrous, olive-brown when dry, shining, lower minutely fulvous- or cinnamomeous-pubescent; margin entire, recurved; variable in size from 8—14 cm. long by 3—4 cm. broad to 16—24 cm. long by 5—9 cm. broad; midrib moderately stout, raised on both surfaces; main nerves 12—16 pairs, parallel, slightly raised above, prominent beneath, very slightly curved to close to the margin and then abruptly curved to fade away closely along it; transverse nervules many, subparallel, rather faint, enclosing the obscure areolate reticulation; petiole 1.5—2.5 cm. long, swollen at base. *Spikes* slender, up to 20 cm. long, in loose terminal or axillary panicles, chiefly ♂, the ♀ apparently scarce; rhachis slender, angular, furfuraceous. *Flowers*: ♂ in clusters of usually 3—5 in the axil of an ovate-acuminate pubescent bracteole about 1 mm. long; perianth-lobes 6, nearly free, obovoid, villous, about 1 mm. long; stamens 12 with rather short slender filaments and small globose anthers; pistillode rather small, very villous: ♀ not known. *Fruits* globose, when mature reaching 5—6 cm. in diam., in rather slender spikes with the rhachis 5 mm. in diam.; cupule very thick-walled (1 cm. at the base, 5 mm. in the middle) the walls granular, hard; covered, except an oblong patch on the inside, with scattered tubercles forming thick stalks from the summit of which radiate simple or staghorn-like branched slender subulate spines, usually 1—1.5 cm. long and minutely stellate-pubescent except at the tips, nearly glabrous at length; nut 1, closely adherent to the cupule, only the umbo protruded from a small orifice; seed ovoid, 2.5 cm. long, 2 cm. in diam. the testa thin and closely pubescent; cotyledons sinuate. *C. javanica*, Hook. f. in



Fl. Br. Ind. V. 620 (not of A. DC.); King Ann. Calc. II. 97, t. 88; both in part only.

PERAK: at various altitudes up to 600 m. alt., Larut and Kinta, King's Collector 3488!, 3939!, 6386!, 6469!, 6522!, 7070!. MALACCA: Maingay K.D. 1459/3!; at Ayer Panas, Goodenough 1316!; at Sungei Udang, Vern. 'Kazu Sabilek', Derry 1093!. SINGAPORE: at Bukit Timah, Ridley 5118!; in garden jungle, Ridley 6683!, 6894!; Cantley 25!. Vern. 'Berangan Gajah', 'Kata Bileh Sebek' (Ridley).

The following specimens, Maingay K.D. 1459/2 from Malacca; Curtis 2492 also from Malacca and Ridley 7023 from Province Wellesley, come near this species, but differ in having thinner leaves which are hardly at all cinnamonaceous on the lower surface. They may belong to a new species, but ripe fruit would be necessary before a description can be written. Von Seemen has identified Maingay's specimens with *C. Hullettii*, but I cannot agree in this.

10. *CASTANOPSIS RIDLEYI*, Gamble in Kew Bull. 180 (1914). A large tree reaching 18—24 m. in height and 60—90 cm. in diam. of stem; branches spreading; branchlets slender, with dark brown bark and many rounded pale lenticels, ultimate ones puberulous; leaf-buds ovoid, the scales lanceolate, tawny-pubescent. Leaves coriaceous; lanceolate, shortly acuminate and mucronate at apex, acute or rounded, usually unequally, at base; upper surface glabrous, shining, dark olive-brown when dry, lower somewhat glaucous, minutely puberulous; margin entire, recurved; 6—13 cm. long, 3—5 cm. broad; midrib slender, slightly impressed above, prominent beneath; main nerves 10—14 pairs, parallel, slightly raised above, straight almost to the margin and there sharply curved along it; transverse nervules close, parallel, branched, enclosing the areolate reticulation; petiole slender, 1—1.5 cm. long. Spikes and flowers not known. Fruits oblong or globose-oblong, 3 cm. long, 2—3 cm. in diam., in slender spikes about 10—12 cm. long, the rhachis scarcely 2 mm. in diam.; cupule crustaceous, granular, brittle, 3 mm. thick; glabrous or slightly tawny-puberulous, covered with distant usually stalked tufts of slender branching curved or straight staghorn-like spines 8—10 mm. long arranged more or less in oblique bands, the spines except their extreme tips covered with scattered strigose stellate tawny-pubescent; nut 1, ovoid-oblong, 2.5 cm. long, adherent to the cupule, the umbo exsert; seed oblong, obtuse, the testa thin, sericeous; cotyledons irregular.

PERAK: on low ground, King's Collector 6831!. MALACCA: at Sungei Udang, Goodenough 1479!.



11. *CASTANOPSIS WALLICHII*, King in Hook. f. Fl. Br. Ind. V. 624 (1888). A tree, reaching 12—15 m. in height and 40—60 cm. in diam. of stem; branchlets slender, darkly lenticellate, with dark greyish-brown rough bark, the ultimate ones and inflorescence covered with minute cinereous subflocculent pubescence; leaf-buds very small, ovoid. *Leaves* chartaceous; lanceolate or ovate-lanceolate, shortly acuminate often mucronate at apex, acute often unequally at base; upper surface glabrous, olive-brown when dry, lower minutely cinereous- or ferrugineous-pubescent; margin entire, often recurved; 5—9 cm. long, 2—4 cm. broad; midrib slender, impressed above, pubescent beneath; main nerves 6—10 pairs, thin, slightly prominent beneath; transverse nervules few and, with the reticulation, irregular; petiole slender, 6—10 mm. long. *Spikes* slender, up to about 10 cm. long, in terminal or subterminal cinereous-pubescent panicles, ♂ or (rarely ?) ♀ or androgynous the ♂ above the ♀ below. *Flowers*: ♂ in clusters, bracteole lanceolate, villous; perianth-lobes 6, unequal, nearly free, villous; stamens 12 with slender filaments and minute globose anthers: ♀ with rugose cupule and minute styles. *Fruits* sessile, obovoid-hemispheric, flattened on the inner side and slightly curved inwards, 3—3.5 cm. in diam., in very stout spikes up to about 10 cm. long; rachis very thick with dark rough bark; cupule when mature thick-walled densely covered on the rounded surface with stout flat triangular curved sharp spines about 7—9 mm. long, smooth or raised on the flattened surface, enclosing the whole of the single nut which is more or less adherent to the cupule; nut depressed-globose, fulvous-pubescent; cotyledons sinuate. King Ann. Calc. II. 106, t. 101 A. *Castanea Tungurrut*, Wall. Cat. 2763 (not of Blume).

PENANG: on Convalescent Hill, *Wallich* 2763!; in open forest at 300—450 m. alt., *King's Collector* 4848!; on Government Hill, *Curtis* 416!, *Fox* 10646!. MALACCA: *Griffith* K.D. 4444!; *Maingay* K.D. 1465!. SINGAPORE: at Bukit Timah, Changi and in garden forest, *Ridley* 3390!, 3959!, 5567!; *Cantley* 34!.

12. *CASTANOPSIS NEPHELOIDES*, King in Hook. f. Fl. Br. Ind. V. 624 (1888). A tree reaching a height of 12—18 m. and 40—60 cm. in diam. of stem; branches spreading; branchlets slender with dark greyish-brown to nearly black bark, slightly puberulous and with few lenticels, the ultimate ones and inflorescence covered with fulvous furfuraceous tomentum; leaf-buds ovoid, perulate, about 4 mm. in diam., the fulvous scales ovate acute. *Leaves* chartaceous;

elliptic or elliptic-oblong or slightly ovate, shortly and obtusely acuminate at apex, acute or somewhat cuneate at base; upper surface glabrous, bright green when fresh, olive-green when dry, lower silvery-grey when fresh, when dry minutely and sparsely furfuraceous-pubescent; margin entire; 9—14 cm. long, 4—6 cm. broad; midrib slender, slightly keeled above; main nerves 9—12 pairs, slender, prominent beneath, parallel, straight at first, curved near the margin to break up in diminishing loops; transverse nervules many, prominent, enclosing the areolate reticulation; petiole 6—10 mm. long, channelled above. *Spikes* slender, up to 15 cm. long, in lax minutely fulvous-tomentose terminal leafless panicles up to 20—25 cm. long, ♂ and ♀ mixed the latter usually uppermost, sometimes androgynous the ♀ below. *Flowers*: ♂ in clusters, somewhat distant below, closer above; bracteoles minute, ovate; perianth-lobes 6, ovate, acute, often unequal, nearly free, villous; stamens 12 with long filaments and small globose anthers; pistillode rather small, villous: ♀ solitary, distant, bract ovate-obtuse, bracteoles 2—3; cupule densely villous; perianth as in ♂ but smaller; styles 3, short. *Fruits* obovoid, flattened on the inner side and often curved, 2.5 cm. in diam., in spikes up to about 15 cm. long; rhachis like the branchlets; cupule when mature reaching 5—6 mm. in thickness, enclosing the whole of the single nut, except the small umbo and persistent stigmas, the outer surface covered except on the flattened side with short pyramidal, angular, fulvous-pubescent tubercles which are more prominent in immature specimens than in mature ones in which they are scarcely more than short ridges; nut adherent to the cupule; seed with thin brown testa and sinuate cotyledons. King in Ann. Calc. II. t. 102.

PERAK: in various places in forest up to about 200 m. alt., *King's Collector* 3843!, 4740!, 5542!, 6417!, 6423!, 6453!, 6518!, 7208!, 7231!, 7235!, 7835!, 7991!, 8624!, 10589!, 10838!; *Scortechini* 1153!. MALACCA: at Brisu, *Derry* 597!. SINGAPORE: at Bukit Timah, *Ridley* 6440!. Vern. 'Resak' (*Ridley*).

13. *CASTANOPSIS CURTISII*, King in Ann. R. Bot. Gard. Calc. II. 107, t. 103 (1889). A tree reaching 20 m. in height; branchlets slender, glabrous, minutely lenticellate, with bark nearly black when dry; leaf-buds small, oblong-lanceolate with lanceolate acuminate minutely grey-sericeous scales. *Leaves* chartaceous; lanceolate or oblanceolate; cuspidate-acuminate, usually rather abruptly, at apex, acute and often unequal at base; both surfaces glabrous,

dark brown when dry, the upper shining, the lower dull, minutely appressed-puberulous on the midrib; margins entire; 7—14 cm. long, 3—5.5 cm. broad; midrib slender, raised on both surfaces; main nerves 10—12 pairs, thin, prominent, subparallel, curving gently to near the margin and then somewhat abruptly along it; transverse nervules many, often branched, somewhat prominent, enclosing the areolate reticulation; petiole slender, 7—9 mm. long. *Spikes* and ♂ *flowers* not known; ♀ with spreading ovate perianthlobes and 3 cylindric styles. *Fruits* solitary, pyriform, 2.5 cm. in diam., the upper side flattened, the apex excentric just above it, in stout lateral racemes about 10 cm. long; pedicel thickened, 8—10 mm. long, 5 mm. thick; cupule moderately thick, minutely cinereous-tomentose, marked with short interrupted vertical ridges, when very young obovoid prominently tawny-villous and tubercular, deflexed; pericarp of nut adherent within to the cupule, the umbo and remains of stigmas alone exsert, its inner surface tawny-villous; seed with thin rugose testa and sinuate cotyledons.

PENANG: at Penara Bukit, etc., at about 300 m. altitude, *Curtis* 1691!; Government Hill at about 450 m. alt. *Curtis* 3034!

*Ridley* 10071 from Kwala Pedas, Negri Sembilan has been identified by A. von Seemen in the Kew Herbarium as being probably *Castanopsis echidnocarpa*, A. DC. The material is so poor that I have thought it best not to include it in the key and descriptions.

In his paper on the Flora of the Telôm and Batang Padang Valleys in the Journ. Fed. Malay States Museum, vol. iv, page 63 (1909), *Ridley* mentions the finding of *Castanopsis argentea*, A. DC. His specimen is in the Kew Herbarium, in young fruit only, and seems to me to come nearer to *C. Hystrix* A. DC., but, to properly identify species of *Castanopsis* ripe fruit is indispensable.

#### Family CXVI. SALICACEÆ.

Deciduous trees or shrubs. *Leaves* alternate, petiolate, stipules free. *Flowers* dioecious, in catkins, each bract with one flower, bracteoles 0. *Perianth* 0. *Disk* of one or more scales or glands or cup-shaped. *Stamens* 2 or more; filaments free or connate; anthers ovate orbicular or oblong, dehiscence longitudinal. *Ovary* sessile or stipitate, 1-celled; ovules few or many on 2—4 subbasal or parietal placentas, erect, anatropous; style short or 0; stigmas short, notched or lobed. *Fruit* an ovoid or lanceolate 2—4-valved capsule. *Seeds* few or many, funicle with a pencil of long silky hairs; albumen 0; cotyledons plano-convex; radicle short, inferior.

—DISTRIB. Genera 2, chiefly in N. temperate regions.

## 1. SALIX, Linn.

Trees or shrubs, sometimes small or prostrate. *Leaves* usually narrow, penninerved, petioles short. *Flowers* usually in erect catkins; bracts small; disk of 1 or 2 separate scales. *Stamens* 2, rarely 3 or more, anthers small, filaments filiform. *Ovary* sessile or stalked; placentas 2; ovules few, 2-seriate on each placenta, usually 4—8. *Fruit* a 2-valved capsule.—*DISTRIB.* Species about 160 with innumerable varieties and hybrids, mostly of the Northern Hemisphere, very few tropical.

*SALIX TETRASPERMA*, Roxb. Cor. Pl. I. 66, t. 97 (1795). A small tree reaching a height of 12 m., trunk up to 3 m. in girth; bark rough; branches suberect; branchlets purplish-brown, smooth. *Leaves* submembranous; ovate-lanceolate or linear-lanceolate, long acuminate at apex, attenuate or rounded at base, sometimes unequally; green and glabrous above nearly black when dry, white and when young more or less silky beneath; margins entire or serrulate; 5—20 cm. long, and 2—5 cm. broad; midrib fairly prominent; main nerves 10—20 pairs, curving to and along the margin and then joining in diminishing loops; secondary nerves many and prominent, between the main nerves, branching and enclosing the areolate reticulation; petiole slender, 1.5—2 cm. long; stipules subulate, deciduous. *Flowers* appearing after the leaves: ♂ in slender usually lateral villous catkins up to 12 cm. long, more or less leafy at base, sessile, single or clustered; bracts ovate, obtuse, silky-villous, under 1 mm. long; disk of 2 glands the outer one larger and obtuse: ♀ in shorter catkins, pedicellate; bracts obovate-oblong, acute, villous; disk of one clasping cup-shaped basal gland. *Stamens* 5—10; filaments free, slender, 2—2.5 mm. long; anthers small, orbicular. *Ovary* fusiform, glabrous; ovules usually 4; stigma sessile, 2-lobed, each lobe again divided. *Capsule* glabrous, ovoid, about 3 mm. long, the 2 valves reflexed, stalk slender about 4 mm. long. *Seeds* 4—6, the funicle silky-penicillate; cotyledons oblong. Roxb. Fl. Ind. III. 753; Willd. Sp. Pl. III. 657; Anderss. Monog. 1, fig. 1 and in DC. Prodr. XVI. ii. 192; Wight Ic. t. 1954; Brandis For. Fl. 462, t. 58 and Ind. Trees 636; Kurz For. Fl. II. 493; Bedd. Fl. Sylv. t. 302 ♂ branch only; Wall. Cat. 3700 A in part, 3700 E, 3707, 9104, 9106; Dalz. and Gibs. Bomb. Fl. 220; Miq. Fl. Ind. Bat. I. ii. 460; Hook. f. in Fl. Br. Ind. V. 626; Cooke Fl. Bomb. II. 662; Prain Beng. Plants 989; Koord. Exkurs. Fl. Jav II.

*Flora of the Malayan Peninsula.*

44. *S. disperma*, Don Prodr. 58; Anderss. in Act. Holm. (1850) 500 and in Journ. Linn. Soc. V. 42. *S. Horsfieldiana*, Miq. l c. 461.

PENANG: at Batu Phunghie and Ayer Etam, *Curtis* 698!; at Balik Pulau, *Ridley* 9406!. PERAK: on open low ground generally near water, Larut, *King's Collector* 1987!; at Ulu Temango, *Ridley* 14495!; at Pluss river *Wray* 546!. PAHANG: at Pekan, *Ridley*!. SELANGOR: at Bukit Kutu, *Ridley* 10543!; at Weld's Hill, *Burn-Murdoch* 8!. MALACCA: Machope Forest at sea-level, *Maingay* K.D. 1466!; *Griffith*!; *Hervey*!; at Bukit Jus *Derry* 929!; at Batang Malaka, *Holmberg* 849!; at Bukit Senggah, Vern. "Dahoo" *Goodenough* 1404!.—DISTRIB. India, China, Malay Archipelago.

Among the specimens from the Malay Peninsula in the Herbaria of Kew, Calcutta and Singapore, I have found none of the flowers of the female plant, so the description of them is taken from Indian specimens. Most of the available material agrees closely with the specimens of *S. Horsfieldiana*, Miq. of Java, as might be expected.

## NOTE

Justification for the issue of the present part of "Materials for a Flora of the Malayan Peninsula" lies partly in the fact that the old series of the Journal of the Society requires to be closed. Its closure has been held up for a number of years on account of the fact that the materials in type did not, as they stood, bring the work to an appropriate end.

Strictly speaking, the present issue under the title "Materials" involves a misnomer, for not long after these materials went to the press the Flora of the Malay Peninsula, itself, by Ridley, appeared, comprising the substance of the materials already published in this Journal and extending to what had not been included here.

Manuscript on the Euphorbiaceæ, extending to several hundred pages more than are given here, was also awaiting publication when the Flora appeared. Publication of this cannot now be justified; but the addition of an index to all the materials, including the species of the present six genera of the Euphorbiaceæ, will appropriately close the work and the series.

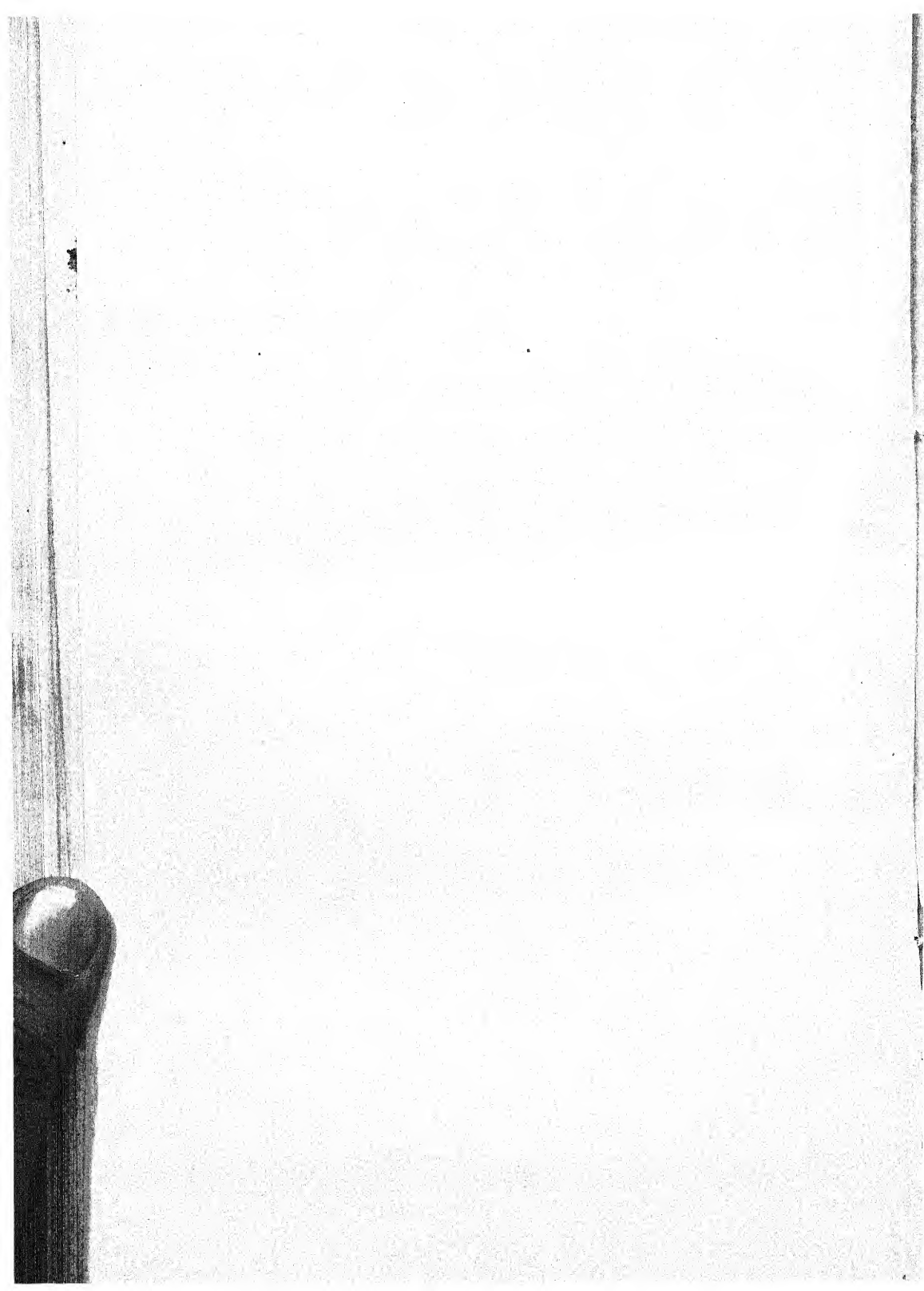
The elaborate precision of Col. Gage's key to the genera of Euphorbiaceæ here given will be apparent. This alone would justify the issue of what is already in type, and with the index allows of a closure which is overdue.

UPENDRANATH BRAHMACHARI,

*Actg. General Secretary,  
Royal Asiatic Society of Bengal.*

CALCUTTA :  
1, PARK STREET,  
August, 1936.





*Materials for a Flora of the Malayan Peninsula*, No. 26.—By

A. T. GAGE.

This part contains the first instalment of Family No. 117, Euphorbiaceae, being an account of the species belonging to six genera, out of the total of 64 genera found to occur in the Malayan Peninsula.

Family CXVII. EUPHORBIACEAE.

Herbs, shrubs or trees, seldom climbers, often with a mild juice. *Leaves* usually alternate and simple, if compound nerves pinnately so; sometimes reduced to scales; glabrous or + — simple or stellately hairy or lepidote; stipules usually present and usually small, caducous or persistent, rarely connate as a bud sheath lamina and petiole junction sometimes glandular. *Flowers* 1-sexual monoecious or dioecious, usually small, often minute. *Inflorescence* usually mixed; sometimes, as in *Euphorbia*, of turbinate involucre resembling a gamosepalous perianth within which 1-stamened ♂ florets surround a solitary ♀ flower reduced to a stipitate pistil but usually axillary or racemose and centripetal, with the ultimate divisions cymose and centrifugal or, from reduction of the ultimate cymules to a single flower, centripetal throughout; sometimes spiriformly racemose or paniculate or sometimes of terminal dichotomous cymes or reduced to simple clusters or solitary flowers; bract subtending the cymes or flowers usually small and scalelike, sometimes enlarged and sometimes connate and involucre form; bracteoles often 2 within a bract or indefinite. *Perianth* seldom 0, when present often differing in the sexes; sometimes single and calycine with valvate or imbricate segments or with sepals in 2 series imbricate and similar or rarely with outer and inner series dissimilar, sometimes double, with petals small and scalelike or rarely with petals larger than the sepals and contorted imbricate. *Male flowers* without a disk or with an intrastaminal disk or extrastaminal disk or with glands or lobes alternating with stamens of outer series. *Stamens* various; solitary or fewer than or as many as the separate or indefinite and sometimes very numerous; filaments free to variously united; anthers variously affixed, usually 2-celled, rarely 3-4-locellate; the loculi usually parallel or didymous with longi-

tudinal dehiscence, sometimes variously divaricate, sometimes + - cruciformly arranged, rarely confluent at the apex and rarely with porous or transverse dehiscence. *Pistillode* present or 0. *Female flowers* without a disk or the disk present and hypogynous and annular or pulvinate or lining the lower part of calyx; staminodes seldom present. *Ovary* usually sessile, 1-many-locular but often 3-locular, the loculi 1-2-ovuled; the ovules pendulous from the inner angle, with ventral raphe, anatropous, often with the funicle expanded into a cellular or scalelike or hoodlike mass; styles present or stigmas sessile; styles as many as the carpels, free or + - united and entire or + - divided, erect or spreading or recurved, subulate or variously thickened or dilated, with stigmatic surface on inner face; sessile stigmas + - lobed or disciform. *Fruit* usually a capsule of as many cocci as ovarian loculi, usually 3, the cocci breaking away into 2 valves from a persistent centre axis; sometimes a drupe with 1-3 cells, seldom of 2-3 pyrenes. *Seeds* as many as the ovules or fewer, attached at or from above the middle to near the apex of the cell, with or without an arillus or caruncle at the apex; albumen usually abundant and fleshy; embryo usually straight, enclosed in the albumen and with large complanate cotyledons, rarely minute with narrow semiterete cotyledons; rarely albumen 0 or very scanty and cotyledons fleshy. **DISTRIB.** Genera about 200 with about 4,000 species mostly confined to the tropics.

Since No. 25 of these "Materials" was published in 1915, the great increase in cost of paper and printing has made condensation—consistent with clearness,—of statement a virtue of necessity. Accordingly the original MSS. of that account of the *Euphorbiaceae*—a great part of which was written before the war—has been entirely rewritten and reduced. The reduction may be far from apparent, as owing to so many of the species—all of which are unisexual to begin with—having dioecious flowers and different inflorescences in the two sexes only a relative, not an absolute shortening of specific descriptions has been possible. The generic definitions have been restricted to descriptions of the characters common only to the Malayan Peninsula species under each genus, but these characters—including the vegetative ones—have been described in considerable detail to avoid repetition of them in successive specific descriptions.

The citations of authors have been ruthlessly pruned, only those being given that I think are likely to be of practical use to students of Malayan *Euphorbiaceae*.

The most important works are:—

E. BOISSIER. *Euphorbia* in D.C. Prodr. XV, ii, 7-187 (published 1862).

- J. MULLER. Euphorbiaceae in D.C. Prodr. XV, ii, 189-1273, (published 1862-66).  
 J. D. HOOKER. Euphorbiaceae in Fl. Brit. Ind. V, 239-477, (published 1887).  
 J. J. SMITH. Euphorbiaceae in Koorders and Valetton Boomsorten of Java, Bijd. No. 12, 9-637, (published in 1910).

To economise space in referring to those four works, only the author's name and page number are given, the name of the work and the year of publication being understood. As these four works should be at the disposal of any systematic student of Malayan Euphorbiaceae, no citations—apart from the more important synonyms—appearing in any of them and accepted by me as correct, are repeated in this account. Only such of the more important synonyms as I have verified or have reason to believe are correct are given. Citations of works other than the four mentioned above are given in full.

The most important collections from the Malayan Peninsula have been made by Curtis, Kunstler, Ridley, Scortechini and Wray. On the specimen tickets Kunstler's own name seldom appears, his identity being hidden usually as "Dr. King's Collector." To save space in the quotation of sheets, the letters *C.*, *KC.*, *R.*, *S.* and *W.* are used to denote respectively *Curtis*, *Kunstler* or *King's Collector*, *Ridley*, *Scortechini* and *Wray*. The surnames of other collectors are given in full. The numbers quoted for sheets collected by Griffith and Maingay are the numbers under which those sheets were distributed from Kew Herbarium.

In the descriptions the colours mentioned are the colours in the dried state unless otherwise mentioned. Under "leaves" the word "nerves" without any qualifying adjective means lateral nerves; the numbers of nerves mentioned in any description of leaves are the numbers counted on one side of the midrib on the lower surface of the leaf. The word "nervules" without any qualifying adjective means the secondary nerves connecting the primary lateral ones. "Reticulation" means the network formed by the ultimate veinlets filling the internervular spaces. The signs "+ -" signify "more or less."

The seeds of very many species, especially of those with 1-seeded capillary loculi, have a + - convex dorsal and 2 ventro-lateral surfaces, the latter varying from almost plane to convex in various degrees and separated by a mesial longitudinal ridge which may be of various degrees of acuteness or obtuseness. Such seeds have a general resemblance to a headless beetle, except of course that in beetles there is usually no distinct mesial ventral ridge. The term "scarabaeoid" is used to indicate briefly the form of such seeds in the generic and specific descriptions.

#### SYNOPSIS OF TRIBES, SUBTRIBES AND GENERA.

The separation by exclusive characters of the various tribes and subtribes to which Euphorbiaceae have been divided by different botanists is by no means easy, as a study of the tribal and subtribal characters given in *Genera Plantarum*, in the *Flora of British India* and in the *Pflanzenfamilien* proves. The divisions here adopted follow in the main Pax's arrangement in the *Pflanzenfamilien* (Teil. III Abt. 5) with diagnostic and other modifica-

tions. *Endospermum* placed by Pax under *Gelonieae* is, on account of its valvate calyx and 4-locellate anthers, transferred to *Acalypheae*. So *Erismanthus* also placed by Pax under *Gelonieae*, although it is petaliferous, is transferred to *Chytiaeae*.

### A. Cells of Ovary 2-ovuled.—Phyllanthoideae.

- a. Embryo large .. .. Tribe I, PHYLLANTHEAE.
- b. Leaves simple.
- c. Flowers petaliferous.
- d. Calyx lobes valvate in bud; staminal filaments united; ♀ disk with a coronal annulus .. .. Subtribe I, Bridelinae.
  - Ovary 2-celled .. .. 1. BRIDELIA.
  - Ovary 3-celled .. .. 2. CLEISTANTHUS.
- d'. Calyx lobes imbricate in bud; filaments free; ♀ disk without a coronal annulus .. .. Subtribe II, Andrachninae.
  - Disk annular or cupuliform; albumen scanty 3. ACTEPHILA.
  - Disk of separate glands; albumen copious .. 4. ANDRACHNE.
- c'. Flowers apetalous.
- d. Leaves alternate.
- e. ♂ flowers in axillary fascicles or solitary.
- f. ♂ disk 0 or annular or of separate glands; stigmas not dilated or only so at tip .. .. Subtribe III, Phyllanthinae.
- g. Disk or glands in the ♂ and usually also in ♀.
  - h. Disk or glands 0 in ♀ .. .. 5. AGYNEIA.
  - h'. Disk or glands in ♀.
  - i. Flowers dioecious .. .. 6. FLUEGGEA.
  - i'. Flowers monoecious.
    - Disk in ♂ and ♀ of fleshy minute scales or (but rarely in ♀) a membranous crenulate or lobed ring or shallow cup .. .. 7. PHYLLANTHUS.
    - Disk in ♂ and ♀ of linear or ligulate petaloid lobes .. .. 8. PHYLLANTHODENDRON.
- g'. Disk or glands 0 in ♂ and ♀.
  - Sepals ♂ and ♀ spreading or ♀ calyx tubular and dentate .. .. 9. GLOCHIDION.
  - ♂ calyx turbinate or obpyriform, with thickened crenulately inflected lobulate margin .. .. 10. BREYNIA.
  - ♂ calyx compressed from above downwards and disciform, with a minute central opening .. .. 11. SAUROPUS.
- f'. ♂ disk a central flat or concave plate; stigmas broadly dilated .. Subtribe IV, Drypetinae.
  - 12. DRYPETES.

- e'. ♂ flowers in axillary spikes or racemes or panicles .. .. Subtribe V, Antidesminae.
- f. ♂ disk very distinct, fleshy circular, pulvinate or subconical .. .. 13. ANTIDESMA.
- f'. ♂ disk 0 or of very minute glands.
- g. ♂ flowers in axillary or subterminal panicles .. .. 14. SCORTECHINIA.
- g'. ♂ flowers in very short catkinlike spikes.  
♂ catkins and lower surface of leaves gland dotted; fruit of laterally flattened cocci .. .. 15. HYMENOCARDIA.  
♂ catkins and lower surface of leaves eglandular; fruit ovoid or globose .. 16. APOROSA.
- g". ♂ flowers in moderately to very long, + — pendent racemes or racemiform panicles .. .. 17. BACCAUREA.
- d'. Leaves opposite .. .. Subtribe VI, Toxicodendrinae.  
18. CHORIOPHYLLUM.
- b'. Leaves compound .. .. Subtribe VII, Bischofiinae.  
19. BISCHOFFIA.
- a'. Embryo minute .. .. Tribe II, DAPHNIPHYLLAE.  
20. DAPHNIPHYLLUM.

## B. Cells of Ovary 1-ovuled.—Crotonoideae.

- a. ♂ and ♀ flowers with single or double perianth and not clustered together in calyxlike involucre.
- b. Inflorescence of terminal 2-3-chotomous cymes .. .. Tribe III, JATROPHEAE.
- c. ♂ and ♀ flowers apetalous .. .. 21. ELATERIOSPERMUM.
- c'. ♂ flowers petaliferous.  
Stamens free .. .. 22. ALEURITES.  
Inner or all stamens connate .. .. 23. JATROPHA.
- b'. Inflorescence axillary or if terminal not of 2-3-chotomous cymes.
- c. ♂ flowers petaliferous.
- d. Outer or all stamens opposite the sepals .. .. Tribe IV, GALEARIEAE.  
Inflorescence of very long slender arched single terminal spiciform racemes .. .. 24. GALEARIA.  
Inflorescence of axillary or lateral fascicles or cymes or panicles .. .. 25. MICRODESMIS.
- d'. Outer or all stamens alternate with the sepals.
- e. Stamens strongly inflexed in the bud .. .. Tribe V, CROTONEAE.  
26. CROTON.



- e'. Stamens erect in the bud **Tribe VI, CLUYTIEAE.**  
 f. Inner or all staminal filaments united.  
   g. Pistillode present .. .. 27. *TRIGONOPLEURA*.  
   g'. Pistillode 0.  
     Stamens 3-5 .. .. 28. *TRIGONOSTEMON*.  
     Stamens 10-20 .. .. 29. *DIMORPHOCALYX*.  
 f'. Staminal filaments all free.  
   g. Anther cells pendulous from the apex .. 30. *AGROSTISTACHYS*.  
   g'. Anther cells connate.  
     ♂ flowers on hairlike pedicels from axillary conicles of minute imbricate bracts; pistillode present; ♀ sepals foliaceous .. .. 31. *ERISMANTHUS*.  
     ♂ flowers not on hairlike pedicels from axillary conicles; pistillode 0; ♀ sepals not foliaceous .. .. 32. *OSTODES*.  
 c'. ♂ flowers apetalous.  
 d. Twining shrubs.. .. **Tribe VII, PLUKENETIEAE.**  
   e. ♂ calyx 3-lobed; stamens 3.  
     Flowers in androgynous racemes; disk 0;  
     ♀ calyx of 3 sepals .. .. 33. *CNESMONE*.  
     Flowers in 1-sexual racemes; disk lining ♂ calyx; ♀ calyx of 5 sepals .. .. 34. *MEGISTOSTIGMA*.  
   e'. ♂ calyx 4-6-lobed; stamens 8-30.  
     Leaves simple, not lobed; involucre 0; ♀ sepals not lacerate or pinnatifid .. .. 35. *PLUKENETIA*.  
     Leaves 3-foliolate or lobed; flower heads with large involucre; ♀ sepals lacerate or pinnatifid .. .. 36. *DALECHAMPIA*.  
 d'. Erect shrubs or trees, rarely erect herbs.  
   e. ♂ calyx valvate in bud .. **Tribe VIII, ACALYPHEAE.**  
   f. Stamens free or united only at the base and unbranched.  
   g. Anther cells 2.  
     h. Cells diverging upwards from the base .. .. **Subtribe I, Acalyphinae.**  
       j. Cells not flexuous or vermiform.  
         Flowers regularly distributed along rachis; cocci dehiscing loculicidally.. 37. *CLAOXYLON*.  
         Flowers in distant clusters on a filiform rachis; cocci dehiscing loculicidally and septically .. .. 38. *MICROCOCCA*.  
       j'. Cells flexuous or vermiform .. .. 39. *ACALYPHA*.  
     h'. Cells not diverging from the base .. .. **Subtribe II, Mercurialinae.**  
       j. Cells pendulous, diverging from the apex .. .. 40. *COELODEPAS*.

- j. Cells parallel or didymous, connate, or adnate to a broad connective.
- k. Stamens 4-10; central disk or convexity 0
- Pistillode 0 .. .. 41. *ALCHORNEA*.
- Pistillode stout .. .. 42. *EPIPRINUS*.
- k'. Stamens 20 to very many; central disk or convexity conspicuous.
- l. Stamens surrounding a flat or slightly concave disk .. .. 43. *COELODISCUS*.
- l'. Filaments imbedded between the lobules of a large convex central glandular mass.
- Filaments exserted, filiform; anthers of usual shape .. .. 44. *BLUMEODENDRON*.
- Filaments very short, peltately bearing orbicular imbricating connectives, on inner surface of which are the cells .. .. 45. *BOTRYOPHORA*.
- l''. Stamens arising from a central, convex, non-lobulate, eglandular receptacle.
- m. Flowers 1-1.5 cm. in diam., appearing before the leaves; fruit a drupe .. .. 46. *TREWIA*.
- m'. Flowers much less than 1 cm. in diam., not appearing before the leaves; fruit capsular.
- n. Flower clusters with about thrice as many bracts as flowers; bracts glumaceous .. .. 47. *KUNSTLERIA*.
- n'. Flower clusters with not more bracts than flowers and usually fewer; bracts not glumaceous.
- Ovule and seed ecarunculate .. 48. *MALLOTUS*.
- Ovule and seed carunculate .. 49. *COCCOCERAS*.
- g'. Anthers with 3-4 locelli.
- h. Anthers with a prominent broad shield-like connective bearing pairs of superposed unequal locelli; fruit indehiscent 50. *PTYCHOPYXIS*.
- h'. Connective not broad; locelli equal and + - cruciformly arranged on face or apex of connective.
- j. Stamens 50-60, distinctly verticillate; connective shortly produced; styles + - elongate and divided .. .. 51. *CLEIDION*.
- j'. Stamens not more than 30, usually much fewer, not distinctly verticillate;

connective not produced; styles short  
and simple or stigmas sessile.

Stamens not arising from a distinct  
clavate receptacle .. .. 52. MACARANGA.

Stamens arising from a distinct cla-  
vate receptacle .. .. 53. ENDOSPERMUM.

f'. Staminal filaments repeatedly  
branched .. .. Subtribe III, Ricininae.

Flowers monoecious; ♀ calyx spathi-  
form; leaves palmately lobed .. .. 54. RICINUS.

Flowers dioecious; ♀ calyx not spathi-  
form; leaves not palmate .. .. 55. HOMONOLA.

e'. ♂ calyx imbricate in bud  
or obsolete.

f. Inflorescence of axillary  
or leaf-opposed clusters,  
seldom of axillary racemi-  
form panicles; disk or  
glands in both sexes or at  
least in the ♀ .. Tribe IX, GELONIEAE.

g. Staminal filaments united with base of  
conspicuous pistillode .. .. 56. CHAETOCARPUS.

g'. Stamens free; pistillode 0 or very small  
Flowers dioecious; clusters leaf-opposed .. 57. GELONIUM.

Flowers monoecious; clusters or pan-  
icles axillary .. .. 58. BALIOSPERMUM.

f'. Flowers in 1-sexual or 2-  
sexual usually glanduli-  
ferous axillary or terminal  
spikes, racemes or pan-  
icles; disk 0 .. Tribe X, HIPPOMANEAE.

g. Erect shrubs or trees.

h. ♂ calyx laterally compressed, of 2  
sepals.

Racemes axillary; stamens 12-15 .. 59. PIMELEODENDRON.

Racemes terminal; stamens 6 or fewer .. 60. HOMALANTHUS.

h'. ♂ calyx not compressed, usually 3-  
lobed.

Flowers dioecious; inflorescence lateral .. 61. EXCOECARIA.

Flowers monoecious; inflorescence ter-  
minal .. .. 62. SAPIUM.

g'. A herb .. .. 63. SEBASTIANIA.

a'. Flowers of both sexes clustered  
within calyx like involucre,  
each cluster consisting of several  
♂ flowers—reduced to stipitate  
stamens—surrounding a central  
solitary ♀ flower reduced to a  
stipitate 3-carpellary pistil; the

whole superficially resembling

a ♂ gamosepalous flower .. Tribe XI, EUPHORBIACE.

64. EUPHORBIA.

*Excluded genus.*—LOPHOPYXIS.

# KEY TO THE GENERA.

For the case of a family like Euphorbiaceae the ideal would be to have three keys, one founded on male material, another on female material in flower and the third on material in fruit. Unfortunately the material so far available is not enough to allow of this ideal being attained. The present key is therefore of the nature of a makeshift and not a satisfactory one. Still it is hoped that in conjunction with the generic synopsis it may be of some use. *Trigonopleura*, *Botryophora* and *Kunstlera* are absent from the female section of the dioecious division, as the female plants of those genera are as yet unknown.

## A. Flowers Monoecious.

a. Cells of ovary 2-ovuled.

b. Flowers petaliferous; petals usually minute.

c. Calyx lobes valvate; staminal filaments united in a short central column; ♀ disk with a coronal annulus.

Ovary 2-celled .. .. 1. BRIDELIA.

Ovary 3-celled .. .. 2. CLEISTANTHUS.

c'. Calyx lobes imbricate; filaments free; ♀ disk without a coronal annulus.

Flowers rather large; disk a basal cup or ring; albumen scanty .. .. 3. ACTEPHILA.

Flowers small; disk of separate glands; albumen copious .. .. 4. ANDRACHNE.

b'. Flowers apetalous.

c. Disk or glands in ♂ flowers and usually also in ♀.

d. Disk or glands 0 in ♀ flowers .. .. 5. AGYNEIA.

d'. Disk or glands present in ♀ flowers.

Disk in ♂ and ♀ of fleshy minute scales or (but rarely in ♂) a crenulate or lobed ring or shallow cup .. .. 7. PHYLLANTHUS.

Disk in ♂ and ♀ of linear or ligulate petaloid lobes .. .. 8. PHYLLANTHODENDRON.

e'. Disk or glands 0 in both sexes.

Sepals of both sexes spreading or ♀ calyx tubular and dentate .. .. 9. GLOCHIDION.

♂ calyx turbinate or obpyriform, with thickened and crenulately inflexed lobulate margin 10. BREYNIA.

♂ calyx compressed from above downwards and disciform with a minute central opening .. 11. SAUROPIUS.

f. Cells of ovary 1-ovuled.

Flowers ♂ and ♀ clustered within calyxlike involucre, each containing several to many ♂

flowers—reduced to stipitate stamens—surrounding a central solitary ♀ reduced to a stipitate 3-carpellary ovary; the whole superficially resembling a ♀ flower with a gamosepalous calyx .. .. 64. EUPHORBIA.

b'. Flowers of different sexes not clustered within calyxlike involucre but separate and with a single or double perianth.

c. ♂ flowers at least petaliferous, usually also the ♀; petals sometimes very minute in ♀.

d. Staminal filaments free.

e. ♂ flowers on hairlike pedicels from axillary conicles of minute imbricate bracts; pistillode capillary; ♀ sepals foliaceous .. 31. ERISMANTHUS.

e'. ♂ flowers not on hairlike pedicels from axillary conicles; pistillode 0; ♀ sepals not foliaceous.

f. Junction of lamina and petiole eglandular 32. OSTODES.

f'. Junction of lamina and petiole prominently 2-glandular.

Inflorescence of terminal 2-3-chotomous cymes; fruit a large drupe .. 22. ALEURITES.

Inflorescence of terminal androgynous spikes or racemes; fruit a capsule .. 26. CROTON.

d'. Inner or all staminal filaments connate to form a central column.

e. Leaves +— orbicular, often lobed; flowers in terminal dichotomous cymes; stamens numerous .. 23. JATROPHA.

e'. Leaves lanceolate, entire; flowers in axillary or terminal spikes or racemes or in axillary or lateral clusters; stamens 3-10.

Flowers and fruits in axillary or terminal spikes or racemes; pistillode 0 .. 28. TRIGONOSTEMON.

Flowers and fruits in axillary or lateral clusters; pistillode 3-cleft, surmounting staminal column .. 27. TRIGONOPLEURA.

c'. Both ♂ and ♀ flowers apetalous.

d. Twining plants.

e. ♂ calyx 3-lobed; stamens 3.

Plant densely villose; racemes androgynous; stamens alternisepalous; disk 0; ♀ calyx of 3 sepals; stigma not larger than ovary .. 33. CNESMONE.

Plant almost glabrous or only pubescent; racemes 1-sexual; stamens central; disk lining ♂ calyx; ♀ calyx of 5 sepals; stigma larger than ovary .. 34. MEGISTOSTIGMA.

e'. ♂ calyx 4-6-lobed; stamens 8-30.

- Leaves simple, not lobed; racemes without conspicuous involucre bracts; ♀ sepals not lacerate or pinnatifid .. .. 35. *PLUKENETIA*.
- Leaves 3-foliolate or lobed; flower heads with conspicuous involucre bracts; ♀ sepals lacerate or pinnatifid .. .. 36. *DALECHAMPIA*.
- d'. Erect shrubs or trees.
- e. Flowers in 2-3-chotomous cymes; staminodes in ♀ flowers .. .. 21. *ELATERIOSPERMUM*.
- e'. Flowers in 1-or 2-sexual axillary or terminal spikes, racemes or panicles or ♀ flowers solitary; staminodes 0.
- f. Stamens not exceeding 20, usually fewer.
- g. Anther cells diverging upwards from the base.
- h. Cells not flexuous or vermiform .. 38. *MICROCOCOA*.
- h'. Cells flexuous or vermiform, very minute. .. .. 39. *ACALYPHA*.
- g'. Cells not diverging from the base.
- h. ♂ calyx compressed, of 2 sepals.
- Racemes axillary, eglandular; stamens 12-15 .. .. 59. *PIMELEODENDRON*.
- Racemes terminal, glandular; stamens 6-10 .. .. 60. *HOMALANTHUS*.
- h'. ♂ calyx not compressed, usually 3-lobed.
- j. Stamens 2-3.
- Inflorescence lateral .. .. 61. *EXCOECARIA*.
- Inflorescence terminal .. .. 62. *SAPIUM*.
- j'. Stamens more than 4.
- k. Glands in ♂ flowers .. .. 58. *BALIOSPERMUM*.
- k'. Glands 0 in ♂ flowers.
- l. Pistillode 0 .. .. 41. *ALCHORNEA*.
- l'. Pistillode present.
- Staminal fils. dilated; cells pendulous or divergent downwards; ♀ sepals not alternating with thick scales .. .. 40. *COELODEPAS*.
- Filaments not dilated; cells parallel; ♀ sepals alternating with thick scales.. .. 42. *EPIPRINUS*.
- f'. Stamens numerous.
- g. Filaments branched; cells distant .. 54. *RICINUS*.
- g'. Filaments not branched; cells not distant.
- h. Cells unequal, in superposed pairs on a broad produced connective .. 50. *PTYCHOPYXIS*.



*N'*. Cells equal, not in superposed pairs.

Anthers 2-celled, cells parallel or didymous, adnate to the connective.. 48 MALLOTUS.

Anthers of 4 minute locelli cruciformly arranged .. .. 51. CLEIDION.

*d''*. A herb .. .. 63. SEBASTIANIA.

## B. Flowers Dioecious.

### I.—MALE PLANTS.

*a*. Flowers petaliferous.

*b*. Disk or glands present.

*c*. All staminal filaments united into a distinct column .. .. 27. TRIGONOPLEURA.

*c'*. All filaments free or only the inner connate.

*d*. Disk a 5-lobed ring .. .. 3. ACTEPHILA.

*d'*. Disk of separate glands.

*e*. Petals 5.

Flowers in lax terminal many-flowered cymose panicles .. .. 22. ALEURITES.

Flowers in axillary or terminal few-flowered racemes .. .. 29. DIMORPHOCALYX.

*e'*. Petals 8; flowers in axillary or lateral glumaceously bracteate racemes or spikes .. 30. AGROSTISTACHYS.

*b'*. Disk or glands absent.

*c*. Flowers in long slender arched single terminal spiciform racemes .. .. 24. GALEARIA.

*c'*. Flowers in axillary or lateral fascicles, cymes or panicles.

Pistillode present .. .. 25. MICRODESMIS.

Pistillode 0 .. .. 32. OSTODES.

*a*. Flowers apetalous.

*b*. Disk or glands present.

*c*. Staminal filaments united with base of conspicuous pistillode .. .. 56. CHAETOCARPUS.

*c'*. Filaments all free or only the inner connate.

*d*. Stamens fewer than 10.

*e*. Disk of separate glands.

Leaves less than 7 cm. long; stamens exserted 6. FLUEGGEE.

Leaves more than 10 cm. long; stamens included .. .. 14. SCORTECHINIA.

*e'*. Disk circular, conical or pulvinate .. 13. ANTIDESMA.

*d'*. Stamens more than 10, often very many.

*e*. Disk a central disciform or quadrate plate with the stamens surrounding it.

Leaves alternate, penninerved, without stellate pubescence; sepals 4-6, imbricate .. 12. DRYPETES.

Leaves opposite, in unequal pairs, basally

- 3-7-plinerved, with stellate pubescence; sepals  
3, valvate .. .. 43. COELODISCUS.
- e'. Disk a central hemispherical polygonally  
multilobulate mass, with filament bases be-  
tween the lobules .. .. 44. BLUMEODENDRON.
- b'. Disk or glands absent.
- c. Leaves trifoliate .. .. 19. BISCHOFIA.
- c'. Leaves simple and opposite.
- d. Leaves of a pair practically of the same size.
- e. Flowers small, not appearing before the leaves;  
stamens not more than 4; leaves not basally  
3-5-plinerved.
- Plants without milky juice; bracts of inflor-  
escence eglandular .. .. 18. CHORIOPHYLLUM.
- Plants with milky juice; bracts of inflores-  
cence with basal wartlike glands .. .. 61. EXCOECARIA.
- e'. Flowers large, appearing before the leaves;  
stamens many; leaves basally 3-5-plinerved .. 46. TREWIA.
- d'. Leaves of a pair distinctly unequal .. 48. MALLOTUS.
- c". Leaves simple and alternate.
- d. Anthers peltate on disciform connectives and  
imbricate to form a globose central tessellated  
mass .. .. 45. BOTRYOPHORA.
- d'. Anther cells in superposed pairs on each side  
of a broad triangularly produced connective;  
the upper cell of each pair much the larger .. 50. PTYCHOPYXIS.
- d". Anther cells 2, equal, diverging downwards  
from their apex .. .. 40. COELODEPAS.
- d"". Anther cells 2, equal, diverging upwards from  
their base .. .. 37. CLAOXYLON.
- d"". Anther cells 2, equal and parallel or didy-  
mous.
- e. Stamens fewer than 20.
- f. Calyx compressed, of 2 sepals .. .. 59. PIMELEODENDRON.
- f'. Calyx not compressed, sepals or lobes or  
teeth more than 2.
- g. Rachis of inflorescence glandular.
- Plants with milky juice; stamens 3 .. 61. EXCOECARIA.
- Plants without milky juice; stamens 4-6 15. HYMENOCARDIA.
- g'. Rachis of inflorescence eglandular.
- h. Flowers in small axillary catkinlike spikes 16. APOROSA.
- h'. Flowers not in catkinlike spikes.
- i. Stipels present .. .. 41. ALCHORNEA.
- i'. Stipels 0.
- k. Undersurface of leaves minutely pellu-  
cidly dotted .. .. 41. ALCHORNEA.
- k'. Undersurface of leaves not minutely  
pellucidly dotted.

- Anthers large, compressed .. 20. *DAPHNIPHYLLUM*.  
 Anthers minute, not compressed .. 17. *BACCAUREA*.  
*e'*. Stamens more than 20, often very many.  
*f*. Filaments repeatedly branched. .. 55. *HOMONOIA*.  
*f'*. Filaments not branched, free on a central  
 receptacle.  
*g*. Sepals 5, much imbricate .. .. 57. *GELCONIUM*.  
*g'*. Calyx valvately 3-6 lobed.  
     Flower clusters with about thrice as many  
     glumaceous bracts as flowers .. .. 47. *KUNSTLERIA*.  
     Flower clusters with not more bracts  
     than flowers and usually fewer; bracts } 48. *MALLOTUS*.  
     not glumaceous .. .. } 49. *COCCOCERAS*.  
*d'''*. Anthers of 3-4 minute equal locelli cruci-  
 formly arranged on face or apex of connective.  
*e*. Stamens 50-60, distinctly verticillate; connec-  
 tive shortly produced .. .. 51. *CLEIDION*.  
*e'*. Stamens not more than 30, usually much  
 fewer, not distinctly verticillate; connective  
 not produced.  
     Stamens not arising from a distinct clavate  
     receptacle .. .. 52. *MACARANGA*.  
     Stamens arising from a distinct clavate re-  
     ceptacle .. .. 53. *ENDOSPERMUM*.

## II.—FEMALE PLANTS.

- a*. Leaves compound, trifoliolate .. .. 19. *BISCHOFIA*.  
*a'*. Leaves simple, opposite.  
*b*. Leaves of a pair practically of the same size.  
*c*. Cells of ovary 2-ovuled .. .. 18. *CHORIOPHYLLUM*.  
*c'*. Cells of ovary 1-ovuled.  
     Plants without milky juice; lamina base 3-5-  
     plinerved; flowers large, appearing before the  
     leaves; ♀ flowers usually solitary on longe-  
     glandular peduncles .. .. 46. *TREWIA*.  
     Plants with milky juice; lamina base not 3-5-  
     plinerved; flowers small, not appearing before  
     the leaves; ♀ flowers many, in axillary glan-  
     dular bracteate spiciform racemes .. .. 61. *EXCOECARIA*.  
     *b'*. Leaves of a pair distinctly unequal .. { 43. *COELODISCUS*.  
     .. { 48. *MALLOTUS*.  
*a''*. Leaves simple, alternate.  
*b*. Cells of ovary 2-ovuled.  
*c*. Petals present .. .. 3. *ACTEPHILA*.  
*c'*. Petals 0.  
*d*. Disk or glands present in flower.  
*e*. Ovary and fruit 1-locular .. .. 13. *ANTIDESMA*.  
*e'*. Ovary and fruit 2-4-locular.  
     Styles elongate; fruit a dehiscent capsule less  
     than 1 cm. in diam. .. .. 6. *FLUEGGEA*.

- Stigmas sessile; fruit drupaceous, indehiscent, more than 1 cm. in diam. .. 12. *DRYPETES*.
- d'. Disk or glands 0.
- e. Undersurface of leaves thickly gland dotted; fruit flattened, winglike .. 15. *HYMENOCARDIA*.
- e'. Undersurface of leaves eglandular; fruit not flattened or winglike.
- f. Fruit 1-celled, 1-seeded.
- g. Fruit drupaceous; albumen abundant; embryo very minute .. 20. *DAPHNIPHYLLUM*.
- g'. Fruit a 4-valved capsule; albumen very scanty or 0; embryo with large fleshy cotyledons .. 14. *SCORTECHINIA*.
- f'. Fruit 2-4-celled, several-seeded.
- Flowers and fruits axillary and sessile or shortly pedicelled on very short bracteate spikes; seeds without an ariloid coat .. 16. *APOROSA*.
- Flowers and fruits on racemiform panicles, + - pendent from leaf or leaf scar axils or from trunk; seeds with an ariloid coat .. 17. *BACCAUREA*.
- 5'. Cells of ovary 1-ovuled.
- c. Flowers petaliferous.
- d. Inflorescence of terminal 2-3-chotomous cymes 22. *ALBURITES*.
- d'. Inflorescence of very long slender arched single terminal spiciform racemes .. 24. *GALEARIA*.
- d''. Inflorescence of axillary or lateral fascicles or cymes or panicles, or if terminal not of 2-3-chotomous cymes nor of single spiciform racemes.
- e. Racemes or spikes glumaceously bracteate .. 30. *AGROSTISTACHYS*.
- e'. Floral bracts not glumaceous.
- f. Calyx greatly enlarging in fruit .. 29. *DIMORPHOCALYX*.
- f'. Calyx not enlarging in fruit.
- Fruit a drupe .. 25. *MICRODESMIS*.
- Fruit a capsule .. 32. *OSTODES*.
- c'. Flowers apetalous.
- d. Disk or glands present.
- e. Calyx valvate or dentate.
- f. Ovary and fruit usually 2-locular; stigmas subpeltate .. 53. *ENDOSPERMUM*.
- f'. Ovary and fruit usually 3-locular; stigmas subulate.
- Fruit sulcately 3-coccate, small, dehiscent .. 37. *CLAOXYLON*.
- Fruit globose, large, indehiscent .. 44. *BLUMEODENDRON*.
- e'. Calyx imbricate.
- Styles present; fruit capsular .. 56. *CHAETOCARPUS*.
- Stigmas sessile; fruit drupaceous .. 57. *GELONIUM*.
- d'. Disk or glands 0.
- e. Leaves stipellate .. 42. *ALCHORNEA*.

- e'. Leaves not stipellate.
- f. Under surface of leaves pellucidly punctate or granular glandular or lepidote.
- g. Under surface of leaves pellucidly punctate; flowers in terminal spikes .. .. 41. *ALCHORNEA*.
- g'. Under surface of leaves granular glandular or lepidote; flowers in axillary spikes or panicles.
- h. Flowers in single axillary spikes; lower surface of leaves lepidote .. .. 55. *HOMONOIA*.
- h'. Flowers in axillary panicles; lower surface of leaves + — granular glandular.
- Seeds carunculate .. .. 49. *COCCOCERAS*.
- Seeds ecarunculate .. .. { 48. *MALLOTUS*.  
52. *MACARANGA*.
- f'. Undersurface of leaves neither gland dotted nor pellucidly punctate.
- g. Bracts of inflorescence with a basal prominent wartlike gland .. .. 61. *EXCOECARIA*.
- g'. Bracts of inflorescence eglandular or only granularly gland dotted.
- h. Fruit capsular, not large.
- Calyx and ovary tomentose; styles palmately branched .. .. 40. *COELODEPAS*.
- Calyx and ovary glabrous; styles not palmately branched .. .. 51. *CLEIDION*.
- h'. Fruit drupaceous, large.
- Fruit ovoid, rufous-velutinoso .. .. 50. *PTYCHOPYXIS*.
- Fruit globose depressed, glabrous .. .. 59. *PIMELEODENDRON*.

#### BRIDELIA, Willd.

Erect or scandent shrubs or trees. *Leaves* alternate, shortly petioled, caducously stipulate; laminæ entire, elliptical, ovate or obovate or lanceolate, penni-nerved; the nerves directed forward and outward, straight or with slight arching towards the margin to anastomose near it; secondary nerves numerous, subparallel and at right angles to the laterals; nervules numerous, fine, subparallel, at right angles to the secondary nerves; ultimate nervation close, subquadrately reticulate. *Flowers* small, usually monoecious, collected in small subglobose clusters that are axillary or strung along the terminal twigs, sessile or shortly pedicelled, surrounded by minute scarious bracteoles; calyx regularly 5-partite, sepals valvate; petals 5, alternate with and much smaller than the sepals, attached just below and external to the outer edge of the disk, obovate or obcuneate, subentire or lobulate; disk in the ♂ pulvinate or

saucer-shaped, in the ♀ lining the calyx tube and giving off an inner coronal lobed or dentate, rarely entire, + - conical annulus that encircles the upper part of the ovary and in fruit is adpressed to the outer portion of the disk. *Stamens* central, 5, with filaments united for some distance below to form a central column, free above and spreading; anthers ovoid, erect in bud, versatile, with parallel cells dehiscing longitudinally; *pistillode* surmounting the staminal column, subconical usually 2-lobed. *Ovary* bilocular; styles usually 2, free or united for a variable distance, bifid above. *Fruit* drupaceous, on a persistent calyx, ovoid or globose, small, with 2 incompletely dehiscent 1-2-usually 1-seeded pyrenes. *Seeds* with fleshy or membranous albumen; embryo straight or slightly curved; cotyledons foliaceous, complanate.

DISTRIB. Tropical Africa, India, Indo-China, Philippines, Malayan Archipelago, Polynesia, Australia.

Species about 50, of which 7 so far known from the Malayan Peninsula.

Flower-clusters in axils of stipular bracts;

♀ disk bristly in flower and fruit .. .. 1. *B. stipularis*.

Flower clusters without stipular bracts;

♀ disk glabrous.

Lamina lanceolate, glaucous or subglaucous on the lower surface .. .. 2. *B. tomentosa*.

Lamina ovate or elliptic, not glaucous on the lower surface.

Lamina almost or entirely glabrous on the lower surface .. .. 3. *B. ovata*.

Lamina tomentose or finely adpressedly pubescent on the lower surface.

Fruits subglobose .. .. 4. *B. pustulata*.

Fruits elliptical.

Lamina softly rufous-tomentose on lower surface .. .. 5. *B. cinnamomea*.

Lamina minutely adpressedly pubescent on lower surface.

Flowers not very minute;

♀ petals rusty-hirsute .. .. 6. *B. Griffithii*.

Flowers very minute;

♀ petals glabrous or with only a hair or two .. .. 7. *B. penangiana*.

1. *BRIDELIA STIPULARIS*, Bl. Bijdr., 597 (1825). A large subscandent fulvous-tomentose shrub, with moderately sized elliptical to oblong-orbicular leaves. *Twigs* alternate, terete, glabrescent below, densely fulvous-tomentose above, 1-4 mm. thick, with inter-



nodes 1—3 cm. long. *Laminae* coriaceous, with acute or subacute or rounded apex, subacute or obtuse or subtruncate or subcordate base and entire or undulate margin, 2·5—12 cm. long, 1·5—9 cm. broad, dark brown on upper, paler brown on lower surface, sparsely fulvous-tomentose on upper surface and + — so on lower; midrib and nerves indented on upper surface, both nerves and nervules prominent on the lower; nerves 8—12; petiole terete, fulvous-tomentose, 8 mm. long; stipules broadly lanceolate, acuminate, fulvous-tomentose, 5—6 mm. long, 3—4 mm. broad. *Flowers* clustered in the axils or on long leafless but stipulate spikes or panicles; the clusters a few mms. in diam., with 8—12 buds in a cluster, + — suffructed by numerous small membranous broadly-lanceolate fulvous-tomentose bracteoles; usually only 1 or 2 buds in a cluster fully developing and usually only ♂ or only ♀ flowers in a cluster. ♂ *Flowers* shortly pedicelled, broadly ovoid acute in bud, 4 mm. long, exclusive of pedicel, and 5 mm. across; calyx divided about half way down, the lobes triangular or broadly lanceolate acute, greenish-yellow, shortly puberulous at the apex or glabrescent; petals shortly broadly clawed, broadly cuneate or obovate, with subtruncate or subacute subcrenulate apex, 2 mm. broad and rather less long; disk thick, subglobulate, projecting slightly beyond the base of the sepals; stamens scarcely equalling the sepals, glabrous; anthers oblong-ovate, less than 1 mm. long; pistillode filiform below and within the staminal tube, free above and ending in a narrowly ovoid glabrous apex. ♀ *flowers* resembling the ♂, but sessile and with petals scarcely clawed and mesially longitudinally sulcate on inner surface with a basal swelling on each side of the sulcus; annulus of the disk narrow, laciniate, with a ring of bristles immediately below it; ovary ovoid, glabrous, 1·5 mm. long, 1 mm. thick; styles 1·5 mm. long, flattened, glabrous, + — bifid; stigmas irregularly clavate, subtuberculate. *Fruit* oblong-ovoid, 1—1·2 cm. long, 8—9 mm. thick, glabrous, smooth, bluish-black; pyrenes subpyriform scaphoid, with flat or slightly concave centrally excavate ventral surface, convex and superiorly keeled dorsal surface, obtuse base and acute carinate apex, 9 mm. long, 6 mm. broad and 3·5 mm. thick, obscurely longitudinally ridged on basal half of dorsal surface. Mull. Arg. 494 in part; Hook. f. 270, in part; Gehrmann in Bot. Jahrbuch, XLI, Beibl. No. 95, 29; J. J. Smith, 315; Jabl. Pflanzenreich, IV, 147; VIII, 55.—*B. retusa* A. Juss. Tent. Euphorb. 27, t. 7, f. 22.—*B. Zollingeri* Miq. Fl. Ind. Bat. I, ii, 364.—*Cluytia stipularis* L. Mant. 127.

PENANG: Wallich 7878 N !. PERAK: S. 1380 !; Kinta River K.C. 813 !. PAHANG: Palau Rumpit, R. 2275 !. MALACCA: Griffith ! Maingay 415 !, 1369 !, R. 2119 !. JOHOR: Muar, C. !; Bukit Patani R. 11041 ! Batu Pahat, R. !. SINGAPORE: McPherson Road, R. 10913 !; Kalang, R. 11269 !

DISTRIB. India, Indo-China, Malayan Archipelago, Philippines, Tropical Africa.

The specimens quoted above agree with the specimen of *Cluytia stipularis* L. in the Linnean Herbarium. *Bridelia scandens* Willd., *Cluytia scandens* Roxb. have usually been given as synonyms of *B. stipularis*, but *B. scandens* is a distinct species as Gehrmann points out, differing from *B. stipularis* in the absence of bristles from the female disk and in having smaller fruits.

2. *BRIDELIA TOMENTOSA*, Bl. Bijl. 597 (1825). A shrub or small tree, with closely arranged leaves, minute monoecious flowers in small sessile or subsessile axillary clusters, and pisiform fruits. *Twigs* terete, 1—2 mm. thick, + — rusty-pubescent and lenticellate; internodes .5—1 cm. long. *Laminae* lanceolate, with acute or sub-acuminate apex, rounded or subcuneate or cuneate base and sub-undulate margin, subcoriaceous, 2.5—11 cm. long, 1—4.5 cm. broad; upper surface dark brown, glabrous or sparsely rusty-pubescent on midrib and nerves; lower surface paler brown, glaucous or subglaucous, + — rusty-pubescent and with prominent midrib and nerves; nerves 8—12; petiole slender, subterete, rusty-pubescent or glabrescent, 3—4 mm. long; stipules narrowly subfalcately lanceolate acuminate, 3 mm. long, 1 mm. broad, — rusty pubescent. *Flower clusters* subglobose, 3—5 mm. in diam., with 10—30 flowers ♂ only or ♀ only or mixed, imbedded in but not suffused by numerous minute membranous rusty-pubescent bracteoles. ♂ *flowers* in bud subglobose, about 1 mm. in diam., expanding to 3 mm., very shortly pedicelled, glabrous; calyx divided almost to base into 5 subequal broadly lanceolate or oblong-ovate sepals; petals less than half the size of sepals, attached below the outer edge of disk, subsessile, subflabelliform or subcuneate, sometimes biauriculate; disk circular pulvinate; stamens scarcely equalling the sepals. ♀ *flowers* slightly larger than the ♂, ovoid in bud, subsessile; calyx as in the ♂; petals minute, subsessile, obovate, subcrenulated disk glabrous, with subvertical membranous laciniately-margined annulus; ovary ovoid, compressed, less than 1 mm. long, glabrous; styles free to the base, terete, half as long as the ovary, shortly bifid; stigmas recurved, slightly irregularly thickened. *Fruit* globose ovoid, smooth, glabrous, bluish-black, 4—5 mm. in diam.

pyrenes subhemispherical, with flat or slightly concave ventral and convex carinate dorsal surface. Mull. Arg., 501; Hook. f., 271; J. J. Smith, 320; Gehrm., in Bot. Jahrbuch. XLI, Beibl. No. 95, 32; Jabl. in Pflanzenreich IV, 147. VIII, 58.—*B. Loureirii* Hook. and Arn. Bot. Beech. Voy. 211. ? *B. lanceaefolia* Roxb. Fl. Ind. III, 737. *B. rhamnoides* Griff. Notul. IV, 480. *B. lanceolata* Kurz in Nat. Tijdschr. Ned. Ind. XXVII, 45. *Amanoa tomentosa* Baill. Adans. VI, 336. *Cleistanthus lanceolatus* Mull. Arg. 507.

KEDAH: Langkawi, C.!. PENANG: Wallich!, Deschamps! Government Hill, C. 112!, 146!. WELLESLEY: Jasek Gelugur, R. 6967!. PERAK: S.!. Larut, K.C. 2492!, 2676!, 5384!; Waterfall R. 2977!; Pankor, R. 7923!. SELANGOR: Klang, Fox!; Gua Batu R. 8202!. MALACCA: Griffith 4885!, Maingay 1370!, 1375!, Hervey!; Sungei Udang, Holmberg 864!, Goodenough 1679!; Panchor, Goodenough 1741!; Ayer Panas, R. 1572!. JOHOR: Bukit Muar, Feilding!. SINGAPORE: Hullett 105!, K.C. 991!, 1260!; Garden jungle, R. 9116!.

DISTRIB. India, Indo-China, Malayan Archipelago, Philippines, Australia.

3. *BRIDELIA OVATA*, Dene. in Nouv. Ann. Mus. III, 484 (1834). A small tree, entirely glabrous except on lower surface of young leaves. Branches terete, 3—4 mm. thick, pale brown-cinereous to black; flowering twigs terete, 1—2 mm. thick, lenticellate, black internodes .5—1.5 cm. long. Laminæ ovate, with acute or subacute apex, rounded or subcuneate base and entire margin, coriaceous, 2—10 cm. long, 1—5 cm. broad; upper surface glossy, green or brown-olivaceous, finely reticulate; lower surface dull, brown sparsely pubescent when young; midrib and nerves slender, reddish and prominent on both surfaces; nerves 8—12, connected by numerous subparallel primary nervules and the latter by numerous rather irregular secondary nervules; reticulation subquadrate; petiole subterete, slender, 4—6 mm. long; stipules subfalcately lanceolate-acuminate, ciliolately margined, 2 mm. long. Flower-clusters axillary and strung at intervals of .5—1.5 cm. along the flowering twigs, of only a few flowers, ♂ and ♀ mixed but usually one sex predominant, encircled at their bases with minute broadly ovate scarious bracteoles. ♂ flowers sessile, subconically ovoid in bud, 2 mm. long, 1.5 mm. across the closed and 4 mm. across the open flower; calyx divided halfway down into deltoid-lanceolate

sepals; petals 1 mm. long and broad, ovate or obovate, sublobulate or subentire; disk saucer-shaped; staminal column short; pistil-lode columnar. ♀ flowers sessile, subconically ovoid in bud, 3 mm. long; calyx divided less than halfway down, lobes narrowly deltoid; petals obovate, 1.5 mm. long, entire or with denticulate apex: annulus of the disk crenulately margined; ovary ovoid; styles short, bifid to the base; stigmas scarcely thickened. *Fruit* globose, 5—6 mm. in diam. smooth; pyrenes subhemispherical, with flat ventral and convex carinate dorsal surface, 5 mm. broad, 3 mm. thick. Mull. Arg. 495; Hook. f. 274; J. J. Smith 324; Gehrm. in Bot. Jahrbuch. XLI, Beibl. No. 95, 33; Jabl. in Pflanzenreich, l.c. 61.—*B. Curtisii* Hook. f. 273; *B. Kurzii* Hook. f. 273; *B. pedicellata* Ridley in Journ. Roy. Asiat. Soc. Straits Branch, No. 59, 167.

PERLIS: Bukit Lagi, R. 14889!

KEDAH: Langkawi, C. 3688!, 8326!. PENANG: Batu Ferengy, C. 1736!; Tulloh Bahang, C. 97!, 1500!

DISTRIB.: Malayan Archipelago, Australia.

In the Flora of British India, Hooker places this species amongst the doubtful and excluded ones, and gives a brief and not very accurate description of it. There are two sheets of the Timor plant in Kew Herbarium collected by Riedlé, on whose specimens Decaisne based his description of *B. ovata*. On one of the sheets have also been fixed indiscriminately a fragment and separate leaves of Wallich's No. 7888 "*Cluytia* from Burma," which is *B. burmanica* Hook. f. The nervation Hooker mentions under his description of *B. ovata* is unfortunately the nervation of *B. burmanica*. The real *B. ovata* in Kew Herbarium has only 8—12 nerves. The specimen referred to by Hooker as *B. ovata* Dene, procured by Kurz from the Baitenzorg Garden is merely a specimen so named by Kurz. It is certainly not *B. ovata* Dene., but I should say *B. minutiflora* Hook. f. I cannot distinguish *B. Curtisii* Hook. f. from *B. ovata* Dene. The material of *B. Curtisii* consists only of a single sheet in flower only, collected by Curtis at Tulloh Bahang, and could seem to be merely a male specimen of *B. ovata* Dene., Ridley's No. 8326, collected by Curtis at Langkawi has been referred by Williams (Bull. Herb. Boiss. 1905, 31) to *B. Kurzii* Hook. f. It appears to me to be exactly like the cotype sheets of *B. ovata* Dene., in Kew Herbarium. *B. Kurzii* Hook. f., seems to me in any case merely a form of *B. ovata* Dene., but the material of it is very scanty. Gehrmann refers *B. Curtisii* Hook. f. to *B. Griffithii* Hook. f., which it does not at all resemble.

4. *BRIDELIA PUSTULATA*, Hook. f. 271. A tree with moderately sized leaves and minute flowers in dense subglobose axillary clusters. *Twigs* stout, angled or subterete, 2—4 mm. thick, postulatedly lenticellate, sparsely shortly setulosely rusty-pubescent or glabrescent; internodes 3—3 cm. long. *Laminae* coriaceous, broadly

ovate, with abruptly acuminate apex, rounded or obtuse base and entire slightly revolute margin, 9.5—18 cm. long, 4—8 cm. broad; upper surface dark brown, glabrous, subnitid; lower clearer brown, rusty pubescent on the prominent midrib and nerves; nerves 9—13; petiole slender, glabrous or sparsely pubescent, subterete, 8 mm. long; stipules triangular-lanceolate, 3 mm. long, rusty pubescent. *Flower-clusters* .5—1 cm. in diam., with numerous flowers, ♂ only or ♀ only or mixed, suffructed by numerous broadly ovate, scarious, rusty-pubescent bracteoles. ♂ *flowers* in bud globose-ovoid, 1.5 mm. long, subsessile, glabrous; calyx divided more than halfway down into triangular lanceolate sepals; petals attached just below outer margin of disk, less than .5 mm. long, sessile, obovate, entire or emarginate; disk circular-pulvinate; staminal column short, glabrous; anthers less than .5 mm. long; pistillode the size of an anther, smooth, glabrous. ♀ *flowers* larger than the ♂, ovoid, subsessile, 3 mm. long; calyx as in the ♂, but with sepals puberulous at their apex; petals as in the ♂ but narrower; disk fleshy, with entire annulus; ovary ovoid, glabrous, scarcely 1 mm. long; styles 2 mm. long, united for more than half their length, sometimes one of them trifid; stigmas irregularly thickened. *Fruit* ovoid, 7 mm. in diam., glabrous, smooth, with one pyrene. Gehrm. in Bot. Jahrbuch. XLI, Beibl. No. 95, 38; Jabl. in Pflanzenreich l.c. 75.

PERAK: Goping K.C. 508!. SELANGOR: Kwala Lampur, no collector's name!. MALACCA: *Maingay* 1371!. JOHOR: Jaffaria, *King*!; Castlewood, *R.* 9167!. SINGAPORE: no collector's name, 2923!; Sungei Jurong, *R.* 3874!; Thompson Road, *Hullett* 5829!; Rogie, *R.* 10740!

5. *BRIDELIA CINNAMOMEA*, Hook. f. 273. A thorny subscandent shrub, with short rigid brachiate branchlets, moderately sized leaves and comparatively few-flowered clusters, axillary and spicate along the terminal twigs. *Branches* terete, 5—8 mm. thick, glabrous, pale brown, with small scattered prickles; twigs subterete, 10—20 cm. long, 2 mm. thick, pustulately lenticellate, pale brown and glabrous on the older parts, dark brown to almost black on the younger parts, sparsely rusty-pubescent or glabrescent; internodes 1—1.5 cm. long on the terminal flowering twigs, 2—3 cm. on the branches. *Laminae* thinly coriaceous, ovate, with acute or shortly acuminate apex, rounded base and entire margin, 3.5—8 cm. long, 2—5.5 cm. broad; upper surface dark-olivaceous, sparsely pubescent on midrib and nerves, subnitid; lower surface sparsely cinna-

mon-tomentose; midrib and nerves slender, prominent on lower surface; nerves 6—8; petiole slender, subterete, 6 mm. long, cinnamon-pubescent; stipules . . . . , *Flower-clusters* 5 mm. in diam., with numerous deep-red flowers, ♂ only or ♀ only, imbedded in a mass of minute, oblong-lanceolate, laciniately-margined scarious bracteoles. ♂ *flowers* pseudo-pedicellate, in bud conical above the pseudo-pedicel, 3 mm. long including the 1 mm. long pedicel, 1.5 mm. in diam., sparsely cinnamon-pubescent on outer, glabrous on inner surface; sepals ovate-lanceolate, half the length of the calyx; petals scarcely 1 mm. long, narrowly obcuneate, with obtuse base and usually a bristle on the lower surface; disk saucer-shaped; staminal column short; pistillode columnar. ♀ *flowers* sessile, ovate, 3 mm. long, 5 mm. in diam. when open; sepals as in the ♂; petals oblong or oblong-obovate, less than 1 mm. long, entire, bristly on the outer surface; disk glabrous, annulus submembranous, irregularly dentately margined; ovary pyriform, glabrous; style single short, stout, bifid, above; stigmas clavellate. *Fruit* ovoid, not seen mature, smooth.

Gehrm. in Bot. Jahrbuch. XLI, Beibl. No. 95, 38, under *B. Griffithii* Hook. f.; Jabl. in Pflanzenreich, l.c. 74.

PERAK: Kinta. 60—100 m., K.C. 7101!; other places in Perak, 60—200 m. K.C. 7960!, 7989!, 8392!, 10612!; Assam Kumbang, W. 2121!; Thaiping, W. 2391!. JOHOR: Kota Tinggi, R. 4157!. SINGAPORE: Seletar, R.!

#### DISTRIB. Malayan Archipelago.

Type sheet is K.C. 7101 from Kinta in Kew Herbarium. Under *B. cinnamomea*, Hooker quotes Perak *Scortechini* as well as Kinta (misprinted Kinta in the Fl. Brit. Ind.), *King's Collector*. In Kew Herbarium the sheets collected by Scortechini Nos. 1822 and 1823 are named by Hooker "*B. cinnamomea*," while the Kinta sheet, K.C. 7101 is named by him "*B. ? cinnamomea*." Scortechini's sheets agree with each other and with Haviland's No. 800 from Borneo. They differ altogether from the Kinta sheet, K.C. 7101, which on the other hand agrees with Haviland's Nos. 937 and 1858 from Borneo. Hooker's description of *B. cinnamomea* is based on the mixture of sheets, but as his description of *B. cinnamomea* as "a thorny shrubby creeper 10—15 feet long" is taken from the Kinta specimen ticket, the Kinta specimens are taken as the type, all the more so as the Scortechini sheets Nos. 1822 and 1823 named "*B. cinnamomea*" by Hooker in the Kew Herbarium and Haviland's No. 800—the latter in fruit—are a species of *Cleistanthus*, being *C. perakensis* Jabl. *B. cinnamomea* may be merely, as Gehrmann considers it, a variety of *B. Griffithii* Hook. f. The two species are certainly very closely allied, both being scandent shrubs.



6. *BRIDELIA GRIFFITHII*, Hook. f., 272. A scandent shrub. *Branchlets* terete, glabrous, pale brown, minutely lenticellate, 3—6 mm. thick; young flowering twigs terete, glabrous or sparsely minutely rusty-pubescent near the nodes, dark brown to black, lenticellate, 1—3 mm. thick; internodes 5—3 cm. long. *Laminae* thinly coriaceous, ovate to broadly lanceolate, with shortly acuminate apex, entire margin and rounded to cuneate base, 4·5—12 cm. long, 2—6 cm. broad; upper surface glabrous, dark brown to dark olivaceous, subnitid, reticulate, with slender prominent midrib and nerves; lower surface dull, brown, sparsely and very minutely pubescent to almost glabrous; nerves 7—12; petiole slender, subterete, 6 mm. long, sparsely rusty-pubescent or glabrescent; stipules narrowly lanceolate, 3 mm. long, rusty-pubescent. *Flower-clusters* axillary and strung along the young twigs at 5—3 cm. long intervals, 6 mm. in diam. of numerous small congested flowers ♂ and ♀ mixed; bracteoles minute, broadly ovate acute, + — pubescent and subcarinate on outer, glabrous on inner surface. ♂ flowers shortly stoutly pseudo-pedicellate, globosely ovoid, 2 mm. long; calyx very sparsely pubescent to almost glabrous on outer, glabrous on inner surface, divided more than halfway down into deltoid sepals; petals less than 5 mm. long, obcuneate or subrhombic, subentire or irregularly lobulate, glabrous or with a bristle or two on outer surface; disk lining the calyx cup, entire; staminal column short; pistillode the size of an anther, glabrous. ♀ flowers in bud shortly bluntly fusiform, 2·5 mm. long; calyx rusty-pubescent on outer surface towards the base, glabrous towards apex of outer surface and on inner, divided about halfway down into deltoid sepals; petals 5 mm. long, ovate or obovate, entire, somewhat fleshy, subcarinate and + — rusty-hirsute on outer surface, glabrous on inner; disk sublobulately margined, with crenulate annulus; ovary ovoid, compressed, glabrous; styles short, subterete, glabrous; stigmas irregularly subspatulately thickened. *Fruit* . . .

Gehrm. in Bot. Jahrbuch. XLI, Beibl. No. 95, 38; Jabl. in Pflanzenreich, l.c. 74. PERAK: *S.*! MALACCA: *Griffith*!

Type sheets are those quoted, which are in Kew Herbarium.

7. *BRIDELIA PENANGIANA*, Hook. f. 272. A tree 5—15 m. high, with spreading branches. *Branchlets* terete, pale-brown, glabrous, pustulate, 2—5 mm. thick; flowering twigs slender, terete, black, lenticellate, glabrous or sparsely rusty-pubescent near the nodes; internodes 5—3 cm. long. *Laminae* membranous or thinly coria-

ceous, broadly or narrowly ovate or obovate or broadly lanceolate or oblanceolate, with shortly, sometimes abruptly, acuminate apex and rounded to cuneate base, 4—14 cm. long, 3—7.5 cm. broad; upper surface brown to dark-olivaceous or almost black, glabrous, nitid, boldly reticulate, with slender prominent midrib and nerves; lower surface dull, brown to dark-olivaceous, finely sparsely rusty-pubescent especially on the slender prominent nerves and midrib; nerves 8—12; petiole subterete, slender, 6 mm. long, glabrous or with a few rusty hairs; stipules minute, lanceolate rusty-pubescent. *Flower-clusters* axillary and strung along the young shoots at .5—3 cm. long intervals, subglobose, 4—6 mm. in diam. of numerous minute flowers ♂ and ♀ mixed, but usually one sex predominating; bracteoles minute, ovate, acute, subfimbriate, + — rusty-pubescent and subcarinate on outer surface, glabrous on inner. ♂ flowers subsessile, subglobose ovoid in bud, 1 mm. long; calyx pubescent on outer surface, glabrous on inner, divided more than halfway down into deltoid sepals; petals very minute, obovate or obcuneate; disk lining the calyx cup, entire; glabrous; staminal column short; pistillode the size of an anther, glabrous, ♀ flowers subsessile obovoid, 2 mm. long; calyx as in the ♂; petals less than .5 mm. long, subspathulately obovate, subentire, glabrous or with a few hairs on outer surface; annulus of the disk dentate; ovary ovoid, compressed, glabrous; styles united below for a variable distance, glabrous; stigmas irregularly thickened. *Fruit* with subacute or acute ends, smooth, 7 mm. long, 4 mm. thick, with one elliptical pyrene. *B. minutiflora*, Hook. f. 273; Gehrm. in Bot. Jahrbuch. XLI, Beibl. No. 95, 38; J. J. Smith, 310; Jabl. in Pflanzenreich, l.c. 75.

PENANG: K.C. 1350!; Government Hill, 150 m. C. 527!; Waterfall, C. 1719!. PERAK: S.!; Ulu Kerling, K.C. 8576!; Penara Bukit, R. 7920!

DISTRIB. Lower Burma, Malayan Archipelago.

Type sheet is C. 527.

I am unable to detect any specific or even varietal difference between *B. penangiana* and *B. minutiflora*. Hooker refers to *B. minutiflora* as a very remarkable species on account of the solitary style. An examination of the type sheets has failed to yield a single flower with a solitary style. All the type flowers examined had styles of the ordinary character, united for a variable distance from the base and each bifid above. Hooker's description appears therefore to have been based on one or several abnormal flowers, or possibly confused with that of *B. cinnamomea*, which has a single style, and which itself as far as Hooker's names in Kew Herbarium are concerned, is a mixture of a *Bri-*

*delia* and a *Cleistanthus*. See note under *B. cinnamomea*. Gehrmann unites *B. penangiana* with *B. Griffithii*, a course that I am not disposed to follow. *B. Griffithii* has considerably larger flowers than *B. penangiana* and is a scandent shrub, whereas *B. penangiana* is a tree reaching to a height of 16 m.

#### CLEISTANTHUS, Hook. f.

Shrubs or trees, with terete or subterete branchlets rarely angled and with alternate, bifarious, caducously or persistently stipulate, shortly-petioled leaves. *Laminae* entire, penninerved; nerves subopposite or alternate, at acute angles with the midrib, directed outwards and forwards with + - curving usually to anastomose in loops near the margin, rarely (in *C. bracteosus*) distinct to the margin; cross-nervules subparallel to irregular; reticulation irregularly polygonal. *Flowers* monoecious, with a + - turbinate or obconic torus, small, in axillary bracteolate clusters, often strung along small-leaved twigs. ♂ *flowers* with calyx divided halfway or rather more than halfway down into 4—5 sepals valvate in bud or slightly imbricate at the apex; petals 5, minute, + - spatulate or ovate or obovate or cuneate, with entire or subcrenulate margin; stamens 5, inserted on a usually short column surrounding the subconically ovoid entire or shortly trifid pistillode; anthers erect in bud, introrse, dehiscing longitudinally, dorsi-fixed, versatile; disk lining the lower part of calyx, entire or + - dentate. ♀ *flowers* with calyx and corolla as in the ♂ and persistent in fruit; ovary 3-locular; styles 3, free or + - connate, shortly bifid rarely simple; disk lining the lower part of calyx and giving off an inner crenulate, dentate, or + - lobed annulus, which surrounds the ovary and + - conceals it; staminodes 5, extremely minute, scalelike, in a circle at base of inner surface of disk. *Fruit* a dry 3-locular 3-sulcate capsule, sessile on or + - stipitate from the persistent perianth, dehiscing into 3 bi-valved rounded cocci, leaving a central columella with pentagonal base; cocci each with a mesial sutural line; endocarp horny, separable from the thin pericarp. *Seeds* subtrigonously ovoid, with a convex subcarinate dorsal surface and two ill-defined ventro-lateral surfaces, smooth, glabrous; apex subacute; base obtuse and often excavate; albumen mostly scanty; cotyledons broad, folded. **DISTRIB.** Tropical Africa, India, Ceylon, Indo-China, Philippines, Malayan Archipelago, Australia. Species about 80.

Flower clusters in axils of bialate bracts .. .. 1. *C. bracteosus*.

Flower clusters not in axils of bialate bracts.

Flowers elongate, slenderly pseudopedicellate; fruits  
on long slender pedicels .. .. 2. *C. pedicellatus*.

Flowers sessile or subsessile ; fruits sessile or only on short pedicels.

(a) Lamina glabrous on lower surface.

\*Lamina glaucous on lower surface.

Lamina ovate, apex abruptly caudate . 3. *C. glaucus*.

Lamina lanceolate elongate, gradually acuminate.

Lamina membranous, upper surface dull 4. *C. membranaceus*.

Lamina coriaceous, upper surface nitid 5. *C. nitidus*.

\*\*Lamina not glaucous on lower surface.

†Calyx pubescent or hirsute in flower and fruit.

Lamina membranous, greenish yellow .. .. 6. *C. flavescens*.

Lamina coriaceous, not greenish yellow.

Petals hirsute .. .. 7. *C. hirsutopetalus*.

Petals glabrous.

Lamina base rounded or subcordate .. .. 8. *C. podocarpus*.

Lamina base acute .. .. 9. *C. glandulosus*.

††Calyx glabrous in flower and fruit.

§Flower clusters minute, of few flowers on very slender glabrous paniculate branchlets.

Lamina membranous .. 10. *C. malaccensis*.

Lamina coriaceous.

Lamina lanceolate, thrice as long as broad, gradually acuminate .. 11. *C. heterophyllus*.

Lamina ovate, not thrice as long as broad, abruptly caudate .. .. 12. *C. gracilis*.

§§Flower clusters not minute, not on slender glabrous paniculate branches.

Stipules persistent, aculeate.. 13. *C. siamensis*.

Stipules caducous.

Lamina base rounded .. 14. *C. parvifolius*.

Lamina base acute.

Lamina of moderate size, membranous .. 15. *C. decurrens*.

Lamina very large, coriaceous .. 16. *C. macrophyllus*.

(b) Lamina + - pubescent or tomentose on lower surface.

\*Lamina glaucous on lower surface.

Petiole very stout, densely tomentose 17. *C. lanuginosus*.

Petiole not stout, not densely tomentose.

Nerves 10—15 .. .. 18. *C. hirsutulus*.

Nerves 5—8.

Lamina base acute; petiole 5—6

mm. long .. .. 19. *C. praetermissus*.

Lamina base rounded; petiole  
2 mm. long.

Lamina apex rounded or  
shortly acuminate; nerves  
at an angle of 60° with mid-  
rib and distinctly curved

20. *C. polyphyllus*.

Lamina apex caudate;  
nerves at an angle of 45°  
with midrib, almost  
straight .. .. 21. *C. Maingayi*.

\*\*Lamina not glaucous on lower surface.

†Pubescence very minute and very  
closely adpressed, rusty or silvery.

Nerves fewer than 8.

Lamina base acute .. .. 22. *C. vestitus*.

Lamina base rounded .. .. 23. *C. Kingii*.

Nerves 12—20 .. .. 24. *C. myrianthus*.

Nerves 8—10 .. .. 25. *C. pseudomyrianthus*.

††Pubescence not very minute, not  
very closely adpressed.

Pubescence rufous.

Lamina base and apex a-  
cute; pubescence sparsely  
ramentaceous .. .. 26. *C. ellipticus*.

Lamina base rounded, apex  
shortly abruptly acumi-  
nate; pubescence not ra-  
mentaceous .. .. 27. *C. rufus*.

Pubescence not rufous.

Flower clusters often  
closely crowded on  
very short spici-  
form branchlets;  
aculeate .. .. 20. *C. polyphyllus*.

Flower clusters not  
closely crowded;  
bracteoles not acu-  
leate.

Nerves 10—15,  
distinctly curv-  
ed .. .. 19. *C. hirsutulus*.

Nerves 6—8, al-  
most straight.. 21. *C. Maingayi*.

1. *CLEISTANTHUS BRACTEOSUS*, Jabl. in Pflanzenreich IV. 147; VIII, 41; (1915). A small tree. *Branchlets*, stramineous-brown, glabrous, 4—8 mm. thick; flowering twigs lateral from the branchlets, 5—15 cm. long, 1—2 mm. thick, rusty scurfily-pubescent or glabrescent; internodes 5—1.5 cm. long. *Laminae* coriaceous, oblong, oblanceolate or oblong-ovate, 16—40 cm. long, 6—13 cm. broad, with caudately acuminate apex and narrowly to broadly cuneate or round base; upper surfaced olivaceous, subnitid, glabrous, obscurely reticulate, with slender indented midrib and nerves; lower surface dull, pale cinnamon to almost silvery, very finely closely adpressedly pubescent, except on midrib and nerves, with minute rusty hair-like scales sparsely interspersed, the prominent midrib and nerves glabrous or sparsely minutely ramentaceous; nerves 14—20, distinct to the margin; cross nervules numerous, close, subparallel, connected irregularly to form a rather open and transversely elongate irregularly polygonal reticulation, petiole very stout, subterete, glabrous, closely wrinkled, 1.5—2 cm. long; stipules not seen. *Flower-clusters* strung along the flowering twigs at short intervals, each in the axil of a stipuliform bract, of rather few flowers and one sex predominating in a cluster; bracts broadly ovate, acute, 7 mm. long and broad, + - rufous-pubescent and often mesially narrowly bialate on the outer surface, glabrous and smooth on the inner; the mesial dorsal alae sometimes united by their inner margin and prolonged into an abrupt caudiform apex; bracteoles broadly ovate, thinly membranous or almost hyaline, glabrous except for a few minute adpressed rufous hairs on the subcarinate outer surface. ♂ *flowers* seen only in young bud; entirely glabrous sepals lanceolate; petals ovate. ♀ *perianth* seen only in fruiting stage, sessile, ovoid, 4—5 mm. long, entirely glabrous; sepals deltoid; petals obovate-spathulate, 1 mm. long; annulus of the disk irregularly dentate; ovary not seen. *Capsule* on a stout, terete, glabrous, 8 mm. long pedicel, the base of which is surrounded by the remains of the perianth, glabrous, crimson turning black, obscurely reticulate, 9 mm. long, 1.3 cm. broad. *Seeds* cordate-ovate, 7 mm. long, 6 mm. broad, 4—5 mm. thick, slightly compressed antero-posteriorly, with convex ecarinate dorsal, and 2 subconvex ventro-lateral surfaces separated by a rounded ridge which has a small irregular hilar depression at its lower end; surface of seed, brownish-black, glabrous, not quite smooth; apex rounded; base cordately retuse.



PERAK: *S.* 1777!, 1917!, 1919!; *W.* 3648!; Kota Bahru, *K.C.* 926!; Goping, *K.C.* 8169!

The type sheets are in Kew Herbarium. This species has been confused with *C. macrophyllus*, Hook. f., from which it differs in the much larger leaves with their finely pubescent undersurface and in the presence of stipular bracts.

2. *CLEISTANTHUS PEDICELLATUS*, Hook. f. 281. A small tree, everywhere glabrous on the vegetative parts, except for a few minute adpressed hairs on very young shoots and on the lower surface of very young leaves, and for rarely a few minute hairs at the base of adult leaves. *Branchlets* pale to dark-brown, 3—5 mm. thick; young twigs, 1—2 mm. thick, black. *Laminae* coriaceous, broadly lanceolate to ovate or oblong-elliptic, 4—12 cm. long, 1.5—5 cm. broad, boldly closely reticulate on both surfaces, with midrib and nerves indented on the upper and prominent on the lower, with subcaudately acuminate apex and cuneate base; upper surface dark-olivaceous to almost black, subnitid; lower surface dark brown, dull to subnitid; nerves 5—7, anastomosing near the margin; cross-nervules irregular, somewhat distant and scarcely distinguishable in the general close reticulation; petiole subterete, shallowly channelled on upper surface, closely transversely wrinkled, 4 mm. long; stipules caducous, minute, narrowly deltoid. *Flower-clusters* axillary, of 20 or more pseudo-pedicellate flowers, ♂ or ♀ only in a cluster; bracteoles minute, ovate, acute, + — dorsally carinate, pubescent or glabrescent on outer surface, glabrous on inner. ♂ *flowers* in bud clove-shaped, glabrous, with an elongated pedicelliform calyx-tube, .5—1 cm. long including the tube, 2 mm across the globosely ovoid top, which is divided into lanceolate sepals; petals subquadrate, with irregularly 2—3-dentate apical marginal disk lining the expanded apical portion of the calyx tube; staminal column short; pistillode short, stout, obscurely trigonously columnar, with obtuse obscurely trilobed apex. ♀ *perianth* seen only in fruit, glabrous; calyx as in the ♂; petals ovate acute or lanceolate, entire, 1.5 mm. long; annulus of the disk membranous, dentate; ovary hirsute; tube of calyx in fruit up to 1.3 cm. long, forming a slender pseudo-pedicel to the capsule. *Capsule* not seen mature, 7 mm. in vertical, 8 mm. in transverse diam., sparsely rusty-hirsute to glabrescent. *Seeds* not seen. *Jabl. in Pflanzenreich*, l.c. 44.

PENANG: *K.C.* 1794!, 1501!; Government Hill, 200—300 m. *C.* 169!, 1401!; West Hill, 300 m. *C.* 3599!; Penang Hill, *Hullett*!.  
PERAK: Thaipeng, *W.* 2375!

The type sheet is *Curtis* 169 in Kew Herbarium.

3. *CLEISTANTHUS GLAUCUS*, Jabl. Pflanzenreich, IV, 147. VIII, 25. (1915). A tree, 10—13 m. high. *Branchlets*, dark-brown, glabrous, somewhat rough or grooved, + - pubescent, 2—5 mm. thick; young flowering twigs a few centimetres long, lateral, 1 mm. thick-grooved and ridged longitudinally, fuscous-tomentose, bearing leaves much smaller than the ordinary ones; internodes 3—5 mm. long. *Laminae* on branches and branchlets coriaceous, ovate or oblong, ovate, 4.5—12 cm. long, 1.5—4.5 cm. broad, with shortly caudately acuminate apex and rounded to subcordate base, glabrous and obscurely reticulate on both surfaces except for a few hairs near base of midrib on lower; upper surface subnitid, olivaceous; lower surface glaucous; nerves slender, 6—7, anastomosing near the margin; cross nervules distant, irregular; petiole scarcely 2 mm. long, subterete, closely transversely wrinkled, sparsely rusty-pubescent or glabrous; *laminae* on flowering twigs not exceeding 2 cm. long and 1 cm. broad, + - pubescent on lower surface; stipules subulate-aculeate, rigid, black, 4 mm. long, sparsely rusty-pubescent or glabrous. *Flower-clusters* axillary, strung at short intervals along the small-leaved twigs, of few flowers ♂ only or ♀ only; bracteoles broadly ovate acute, + - carinate and rusty-pubescent on outer, glabrous on inner surface. ♂ *flowers* not seen. ♀ *flowers* ovoid; calyx pubescent on outer, glabrous on inner surface, sepals deltoid; petals spathulate or obcuneate, acute or subacute, subentire, 1 mm. long, glabrous; annulus of the glabrous disk dentate, membranous; ovary ovoid, densely hirsute. *Capsule* not seen entire, sparsely hairy, obliquely closely shallowly grooved. *Seeds* not seen.

PERAK: Goping, K.C. 4526 !; locality illegible, R. 7926 !

The type sheet is K.C. 4526 in Kew Herbarium.

4. *CLEISTANTHUS MEMBRANACEUS*, Hook. f. 278. A tree up to 10 m. high, with slender hanging branches *Branchlets* pale-brown, glabrous, 2—5 mm. thick; flowering twigs 1—2 mm. thick, angular, grooved, + - rusty-pubescent. *Laminae* membranous, narrowly lanceolate, with caudately acuminate apex and acute or subacute base, 3.5—18 cm. long, 1—5.5 cm. broad; upper surface glabrous or slightly rusty-pubescent on basal end of midrib, olivaceous, dull, reticulate; lower surface at first very finely sparsely adpressedly pubescent, finally glabrous, subglaucous; midrib and nerves slender; nerves 10—15, anastomosing near the margin; cross-nervules ir-

regular; petiole slender, subterete, closely transversely wrinkled, + - setulosely rusty-pubescent, 4 mm. long; stipules persistent, scarious, aculeate, rusty-pubescent to glabrous, 5-8 mm. long. *Flower-clusters* strung along the twigs at intervals of .5-1.5 cm., of fairly numerous flowers, ♂ only or ♀ only; bracteoles ovate, acute, rusty-pubescent on outer, glabrous on inner surface. ♂ *flowers* clove-shaped in bud, pseudo-pedicellate, 2.5 mm. long, 1-2 mm. in diam., sepals ovate, acute, sparsely pubescent or glabrous; petals very minute, broadly obovate, glabrous; staminal column short; pistillode columnar, obscurely 3-ridged, pubescent. ♀ *flowers* sessile, globosely ovoid, 2 mm. long, sparsely pubescent or glabrescent; sepals deltoid; petals ovate entire, glabrous, less than .5 mm. long; annulus of the disk membranous, crenulate; ovary globosely ovoid, hirsute; styles very short, free; stigmas scarcely thickened. *Capsule* sessile, + - adpressedly rusty-pubescent, 8 mm. in vertical 1 cm. in transverse diam.; cocci sparsely setulosely puberulous on inner surface. *Seeds* cordate-ovate, 6 mm. long and broad, 4 mm. thick, glabrous, blackish-brown, obscurely ridged, with convex carinate dorsal and sub-bilateral ventral surface, obtuse apex and cordately excavate base. *Jabl. in Pflanzenreich*, l.c. 26.—*C. stipulatus* Hook. f. 281.

PENANG: Penang Hill, R.!. PERAK: W. 3257!; Larut, K.C. 1974!, 3355!, 3424! 6619!

The type sheets are K.C. 3355 and 6619 in Kew Herbarium. Hooker's *C. stipulatus* (K.C. 1974) is merely a mature fruiting specimen of *C. membranaceus*. The capsule of K.C. 1974 is not quite glabrous, but pubescent at base and apex like most of the so-called glabrous capsules.

5. *CLEISTANTHUS NITIDUS*, Hook. f. 280. A small tree. *Branchlets* pale-brown, 2-3 mm. thick, + - pubescent towards the apex, glabrous lower down; young twigs 1 mm. thick, terete, fulvous or rusty-tomentose; internodes 1-2 cm. long. *Laminae* thinly coriaceous, lanceolate, 5-15 cm. long, 1.8-5 cm. broad, with caudate acuminate apex and subtruncate or obtusely rounded or almost subcordate base; upper surface glabrous, olivaceous, subnitid, reticulate; lower surface dull, brown-olivaceous, subglaucous, very sparsely and finely adpressedly pubescent or glabrous; midrib indented and nerves slightly prominent on upper, both prominent on lower surface; nerves 8-12, anastomosing near the margin; cross-nervules irregular; petiole rather stout, subterete, fulvous-tomentose or glabrescent, 5 mm. long; stipules not seen. *Flower-clusters*

axillary, 4 mm. in diam., rufous-tomentose, of ♂ or of ♀ flowers only; bracteoles ovate, acute or subacute, carinate, + — rusty-tomentose on outer surface, glabrous on inner. ♂ flowers sessile, obpyriform in bud, 2 mm. long; calyx rufous-tomentose externally, glabrous internally, with deltoid sepals; petals broadly flabelliform crenulate, glabrous, .5 mm. across the apex; disk smooth, entire; staminal column short, stout, glabrous; pistillode pubescent at the base, deeply trifid. ♀ flowers with calyx of the ♂; petals obovate, subentire, 1 mm. long and broad, glabrous; annulus of the disk membranous, dentate and later 5-lobed; ovary subglobose, densely hirsute; styles slender, free, bifid halfway down; stigmas subclavate. Capsule on a very short stout pedicel that is almost concealed by the perianth, 8 mm. in vertical, 9 mm. in transverse diam., at first rufous-tomentose, later glabrescent and reticulate. Seeds cordiform, 6 mm. long, 4.5 mm. broad, 3 mm. thick, with convex carinate dorsal and 2 obscurely defined ventro-lateral surfaces obtuse apex and cordately excavate base.

Jabl. in Pflanzenreich, l.c. 28, *C. Curtisii*, Jabl. l.c. 22.

PENANG: K.C. 1348!, *C.* 3002!; Government Hill, *C.* 146!, 1575!, 3048!; Waterfall, *C.* 1464!; Batu Ferengy, *C.* 3588!. SINGAPORE: Lobb!

The type sheets are Curtis 146, and Lobb's sheet, both in Kew Herbarium.

6. *CLEISTANTHUS FLAVESCENS*, Jabl. in Pflanzenreich, IV, 147; VIII, 19; (1915). A small tree, 5 m. high. Branchlets glabrous pale brown, 2—5 mm. thick; young twigs, darker brown, 1 mm. thick, sparsely shortly puberulous or glabrescent; buds rusty-tomentose. Lamine membranous or thinly coriaceous, elliptic, 5—15 cm. long, 2—6 cm. broad, with finely acuminate apex and acute or cuneate base; upper surface yellowish-green, glabrous, subnitid, reticulate; lower surface dull, yellowish-green, glabrous or with sparse, very minute, adpressed, hair-like scales on midrib and nerves and general surface; nerves slender, 7—10, anastomosing near the margin, often with a minute triangular pit in the nerve-midrib axil; cross-nervules distant, rather irregular and not very distinct from the general moderately close reticulation; petiole slender, subterete, + — setulosely puberulous, 4—8 mm. long, closely irregularly wrinkled; stipules caducous, aculeate, a few mms. long, rusty-pubescent to glabrous. Flower-clusters axillary along the young twigs, small, of few flowers ♂ only or ♀ only; bracteoles broadly ovate, with

caudate apex, + - rusty-pubescent on outer, glabrous on inner surface. ♂ *flowers* seen in bud only, ovoid, sessile; calyx rusty-pubescent externally, glabrous internally, sepals deltoid; petals subquadrate, apiculate; staminal column short; pistillode short, stout, subtrigonously columnar, with obtuse, obscurely 3-lobed apex. ♀ *flowers* sessile, ovoid, 3.5 mm. long; calyx as in the ♂; petals flabelliform with subcrenulate apical margin, less than 1 mm. long; disk subcrenulate, with annulus reduced to a very narrow irregularly dentate membranous ring, scarcely separable from the disk; ovary globose ovoid, densely hirsute; styles short, slender, glabrous; stigmas recurved, subspathulately thickened. *Capsule* not seen mature, sessile, 7 mm. in vertical and transverse diameters, pale brown, obscurely obliquely closely grooved, + - adpressedly hairy.

PERAK: Goping, K.C. 686!; Sundeng Keledang, R. 9578!.

The type sheet is K.C. 686 in Kew Herbarium. See note under *C. glandulosus*.

7. *CLEISTANTHUS HIRSUTOPETALUS*, Gage in Kew Bull. No. 7 (1914), 239. A tree about 10 mm. high. *Branchlets* and young twigs, glabrous, the former dark brown, lenticellate 2—3 mm. thick, the latter pale-brown, 1—2 mm. thick; internodes 1—3.5 cm. long. *Laminae* coriaceous, narrowly ovate-elliptic or lanceolate, 7—18 cm. long, 3—5.5 cm. broad, glabrous, with subcaudately acuminate apex and rounded or subcuneate base, which in the latter case is contracted above the petiole, with 2 small pulvinate swellings at the petiolar junction; upper surface pale olivaceous to brown, nitid, with slender midrib, obscure nerves and reticulation very obscure; lower surface dull and paler than upper, with nerves and reticulation less obscure; nerves 6—8, anastomosing near the margin; cross nervules few, irregular, scarcely distinguishable from the general reticulation; ultimate reticulation visible only by transmitted light, very close, subquadrate; petiole subterete, glabrous, closely transversely wrinkled, 3—7 mm. long; stipules caducous, lanceolate, 3 mm. long, glabrous or with a few minute hairs. *Flower-clusters* axillary, of rather few flowers, ♂ only or ♀ only; bracteoles ovate or lanceolate, + - rusty-pubescent and subcarinate on outer surface, glabrous on inner. ♂ *flowers* not seen. ♀ *flowers* sessile, ovoid, 6 mm. long; calyx adpressedly hairy externally, glabrous internally, with deltoid or lanceolate sepals; petals obovate, entire, 1.5 mm. long, adpressedly hirsute on outer surface, the hairs extending beyond the apex, glabrous on inner; annulus of the disk mem-

branous, dentate; ovary subglobose ovoid, hirsute. *Capsule* sub, sessile on a stout, 3 mm. long, obconically terete, sparsely adpressedly hirsute pedicel that is almost concealed by the perianth, sparsely hirsute at the base, otherwise glabrous, smooth, light-brown, 1 cm. in vertical diam. *Seeds* suborbicularly ovoid, 8 mm. long, 7 mm. broad, 5 mm. thick, with convex subcarinate dorsal and 2 ill-defined ventro-lateral surfaces.

PENANG: Penaru Bukit, C. 3049!; Bukit Tumiary, no collector's name, 1420 (1655)!. All type sheets.

8. *CLEISTANTHUS PODOCARPUS*, Hook. f. 281. A tree 12—16 m. high. *Branchlets* angled, scurfily-pubescent to glabrescent, 2—3 mm. thick; young twigs rusty-tomentose. *Laminae* coriaceous, oblong-lanceolate, 7—22 cm. long, 2.5—7.5 cm. broad, with acuminate apex and subcordate base; upper surface olivaceous, glabrous, subnitid, with indented midrib and nerves; lower surface dull, olivaceous, glabrous or + - scurfily-pubescent on basal part of the stout midrib; nerves and midrib prominent; nerves 7—9, anastomosing near the margin; petiole stout, subterete, + - rusty-pubescent, 7 mm. long; stipules caducous, minute, triangular, rusty-pubescent. *Flower-clusters* axillary, of few comparatively large flowers, ♂ or ♀ only; bracteoles broadly ovate, rusty-pubescent on outer surface, glabrous on inner. ♂ flowers not seen. ♀ flowers sessile, ovoid, 8 mm. long, 4 mm. in diam.; calyx rusty-pubescent on outer, glabrous on inner surface, sepals deltoid; petals obcuneate, glabrous, 1.5 mm. long, with rounded crenulate apical margin; annulus of disk not distinctly seen; ovary globose ovoid, densely hirsute; styles free, short, somewhat stout and flattened, tomentose at the base, glabrous above; stigmas subspathulately thickened. *Capsule* on a short, stout, terete, pubescent pedicel, that scarcely exceeds the perianth, rusty-villose, 8 mm. in vertical, 1 cm. in transverse diam.; cocci closely obliquely shallowly ridged and furrowed. *Seeds* not seen. Jabl. in Pflanzenreich, l.c. 29.

PERAK: Larut, K.C. 3277!, 3297!, 6427!, 6450!, 6685!, 6701!, 7740!.

The type sheet is 3277 in Kew Herbarium.

9. *CLEISTANTHUS GLANDULOSUS*, Jabl. in Pflanzenreich, IV, 147; VIII, 18; (1915). *Branchlets* dark-brown, glabrous, 2—3 mm. thick; flowering twigs subterete or angled, glabrous or rusty-pubescent near the nodes. *Laminae*, coriaceous, elliptic-lanceolate, 4.5—6



cm. long, 1.5—3.5 cm. broad, with acuminate apex and acute or cuneate base; upper surface olivaceous, subnitid, obscurely reticulate, with slender midrib and nerves; lower surface brown, glabrous or with a few hairs near base of midrib, dull, reticulate, with nerves and midrib prominent; nerves 6—8, anastomosing near the margin; cross-nervules irregular, scarcely distinguishable; ultimate reticulation visible only by transmitted light, fine, close; petiole subterete, glabrous or sparsely setulose, closely transversely wrinkled, 6—8 mm. long; stipules subpersistent, subulate to aculeate, rigid, rusty-pubescent to glabrous, 6 mm. long. *Flower-clusters* axillary, of rather few flowers with one sex predominant; bracteoles broadly ovate, with abruptly caudate apex, + — rusty-pubescent and subcarinate on outer surface, glabrous on inner or with a few basal hairs. ♂ *flowers* shortly pseudo-pedicellate, obpyriform in bud, 3 mm. long; calyx pubescent externally, glabrous internally, sepals deltoid; petals subrhombic to subreniform, glabrous, crenulate; retuse or apiculate, less than .5 mm. long; disk glabrous, with subcrenulate margin, glandular opposite the petals; staminal column short; pistillode subconically ovoid with obtusely trifid apex. ♀ *flowers* and *fruit* not seen.

PERAK: Gunong Keledang, R. 9578 !.

The number 9578 has also been given to a specimen of *C. flavescens* Jabl. from Sundeng Keledang. See under *C. flavescens*.

10. *CLEISTANTHUS MALACCENSIS*, Hook. f. 277. *Twigs* brown, 1—3 mm. thick, glabrous or fulvous-tomentose or sparsely rusty-pubescent near the apices. *Laminae* subcoriaceous, lanceolate, 5.5—14 cm. long, 4 cm. broad, with acuminate apex and acute or cuneate base, glabrous, dark-brown on upper, paler brown on lower surface; nerves 4—6 anastomosing near the margin; cross nervules numerous, close, subparallel; petiole slender, glabrous, subterete, 5—6 mm. long; stipules not seen. *Flower-clusters* axillary and strung at short intervals along slender short simple or longer paniculately branched lateral twigs, 2—3 mm. in diam., with few minute flowers; bracteoles ovate, glabrous on inner surface, with easily removed scurfy fulvous scale-like hairs on outer. ♂ *flowers* sessile, ovoid in bud, 2 mm. long, glabrous; sepals ovate; petals spathulate; disk circular pulvinate; pistillode subconically columnar, caducously rusty tomentose, obscurely 3-lobed. ♀ *flowers* in bud conically ovoid, glabrous, 2 mm. long; sepals lanceolate; petals oblong-obovate, glabrous, less than .5 mm. long, entire; annulus of

the disk narrow, membranous, dentate; ovary ovoid, caducously hirsute; styles simple. *Capsule* on a terete, glabrous, 5 mm. long pedicel, glabrous, 8 mm. in vertical, 9 mm. in transverse diam, *Seed* trigonously ovoid, glabrous, brownish-black, 6 mm. long, 4 mm. broad, 3 mm. thick, with convex carinate dorsal and 2 irregular ventro-lateral surfaces, obtuse base and subacute apex. Jabl. in Pflanzenreich, IV, 147. VIII, 32.

MALACCA: *Maingay* 1373! type sheet in Kew Herbarium.

SINGAPORE: Chu Chu Kang, R. 4586!; Seletar, R. 6169!.

11. *CLEISTANTHUS HETEROPHYLLUS*, Hook. f. 276. A tree, entirely glabrous, except the bracteoles, ovary and sometimes the flowering twigs. *Branches* flexuous, 1—3 mm. thick, greyish-brown; flowering twigs sometimes sparsely setulosely puberulous; internodes .5—1.5 cm. long. *Leaves* large on the branches, small and caducous. on the flowering twigs; *laminæ* of the large leaves coriaceous, lanceolate, 7—16 cm. long, 2.5—7 cm. broad, with long acuminate apex and subcuneate base; upper surface brown-olivaceous, subnitid, obscurely reticulate; lower surface dull, brown; midrib prolonged to extreme tip; nerves obscure on upper surface, 4—7, anastomosing near the margin; cross-nervules indistinct; reticulation well defined; petiole subterete, slender, 5 mm. long; stipules not seen; *laminæ* on flowering twigs 1.5—2.7 cm. long, 4—6 mm. broad, lanceolate, with sub-acuminate, acute or subacute apex and subcuneate base. *Flower-clusters* axillary and strung at 6—8 mm. intervals along the lateral and terminal small-leaved twigs, 3—4 mm. in diam., of few minute flowers, ♂ and ♀ mixed; bracteoles scarious or membranous, deciduously bristly on outer surface, glabrous on inner. ♂ *flowers* sessile, ovoid, glabrous, 2 mm. long; sepals deltoid or lanceolate; petals obovate, less than .5 mm. long; disk circular pulvinate; pistillode with 3-lobed apex. ♀ *flowers* turbinate, sessile, 3—4 mm. long, glabrous; sepals deltoid; petals narrowly obovate, retuse or subentire, .5 mm. long; ovary ovoid, bristly hirsute; styles short, free, as long as the ovary; stigmas slightly thickened. *Capsule* on a very short stout pedicel that scarcely exceeds the perianth, 1.2 cm. in both diameters, pale brown, glabrous except for scattered hairs at base, apex and in the sulci. *Seeds* ovoid, compressed, smooth, brown, 8 mm. long, 6 mm. broad, 5 mm. thick, with a convex subcarinate dorsal, 2 ill-defined ventro-lateral surfaces, and obtuse apex and base. Jabl. in Pflanzenreich, l.c. 14, *C. laevis* Hook. f. 277. PAHANG: Pulau Tioman, *Burkill* !.

MALACCA! *Maingay* 1372!; Bukit Bruang, C.!. SINGAPORE North Singapore, K.C. 5!; Changi, R. 3417!; Botanic Garden, Murton!, R. 3418!; Bajau, R. 6247!; Sungei Jurong, R. 6744!.

*C. laevis* was founded on a solitary and poor specimen, which I am unable to distinguish from *C. heterophyllus*, also founded on a solitary and poor specimen. The presence or absence of the small leaves is no criterion of specific difference as they are caducous. The appearance of the reticulation on the lower surface varies with the age of the leaf. In young leaves the nerves and nervules appear as yellowish and "unfinished" on a light chocolate background; in older leaves the reticulation is distinct and similar in all the specimens to that of the type of *C. heterophyllus*.

12. *CLEISTANTHUS GRACILIS*, Hook. f. 277. A small bushy tree 5—8 m. high; twigs divaricate, glabrous, 1—2 mm. thick. *Laminae* subcoriaceous, lanceolate, 2.5—6.5 cm. long, 1—3 cm. broad, with acuminate or caudate apex and acute base, entirely glabrous; upper surface brown-olivaceous, subnitid, lower yellowish-brown, dull; nerves 5—7, anastomosing near the margin; petiole slender, subterete, 3—4 mm. long; stipules not seen. *Flower-clusters* 2—5 mm. in diam., of comparatively few flowers, ♂ and ♀ mixed, bracteoles ovate, hirsute on outer, glabrous on inner surface. ♂ *flowers* sessile, ovoid acute in bud, 2 mm. long, glabrous, sepals unequal, 2 short deltoid and 3 longer lanceolate; petals extremely minute, spatulate; disk circular pulvinate, sublobulate; pistillode columnar, undivided, caducously scurfy-tomentose. ♀ *flowers* sessile, larger than the ♂, 2.5—3 mm. long, fusiform in bud, glabrous; sepals subequal, lanceolate; petals linear-oblong or subspathulate, less than .5 mm. long; disk lining the obconical calyx cup and extended above it as 5 broad subdentate + — connivent lobes; ovary ovoid, densely hirsute; styles short, united at the base, undivided; stigmas clavellate. *Capsule* sessile, 8 mm. in diam., sparsely hairy at the base. *Seeds* ovoid-oblong, 5 mm. long, 4 mm. broad, 3.5 mm. thick, with convex carinate dorsal and 2 ventro-lateral irregular sub-convex surfaces. Jabl. in Pflanzenreich, l.c. 15, *C. dasyphyllus* Williams in Bull. Herb. Boiss. 1905, p. 31. PERLIS: R. 14908! Kedah: K.C. 1709!; Langkawi, C. 2810!. PAHANG; Kota Glanggi, R. 2301!

The type sheet is K.C. 1709 in Kew Herbarium. Curtis No. 2810, on which Williams founded *C. dasyphyllus* seems to me merely a specimen of *C. gracilis*, with a predominance of male flowers. The adult leaves are broader in proportion to their length in Curtis' specimens than in the type of *C. gracilis*, but the younger leaves are alike in both.

13. *CLEISTANTHUS SIAMENSIS*, Craib in Kew Bull. 71 (1913) shrub or small tree, 3—6 m. high. *Branchlets* dark brown, 2—3 mm. thick, glabrescent; flowering twigs 1—2 mm. thick, grooved, + — shortly rusty or fulvous pubescent; internodes 5—3 cm. long. *Laminae* coriaceous, lanceolate, 4—16 cm. long, 1—4.5 cm. broad with acute or acuminate apex and obtusely cuneate base, concolorous, pale green-olivaceous; upper surface shiny, reticulate, glabrous with a few minute hairs on base of midrib; lower surface dull, glabrous or sparsely pubescent on the prominent nerves and midrib nerves 10—16, anastomosing near the margin; cross-nervules not distinguishable from the moderately close reticulation; petiole subterete, sparsely puberulous or glabrescent, 2 mm. long, closely transversely wrinkled; stipules persistent, subulate aculeate, sparsely puberulous or glabrous, 5—6 mm. long. *Flower-clusters* 3—7 mm. in diam., of comparatively few flowers, ♂ and ♀ mixed; bracteoles ovate, subulate, carinate and hirsute on outer surface, glabrous on inner. ♂ *flowers* subglobose, sessile, 3 mm. long, entirely glabrous, sepals deltoid; petals flabelliform, less than 1 mm. long, with irregularly crenulate or lacerate apical margin; disk lining the calyx cup sublobulate; pistillode subtrigonously columnar, with 3-fid apex, caducously scurfy-pubescent. ♀ *flowers* globose ovoid, sessile, 3—mm. long, with perianth as in the ♂; disk subcrenulate; annular very membranous, narrow, below the upper edge of the disk and closely adherent to inner surface of disk as to be scarcely distinguishable; ovary subglobose, densely hirsute; styles free, slender short, terete glabrous, shortly bifid; stigmas subspathulately thickened. *Capsule* sessile, hirsute at base and apex and in the sulci otherwise glabrous or with only a few scattered hairs, reticulate 7 mm. in vertical, 1 cm. in transverse diam. *Seed* not seen. Jabl. in Pflanzenreich, l.c. 23. *C. penangensis* Jabl. in Pflanzenreich, l.c. 21.

PENANG: *K.C.* 1673!; Waterfall, *C.* 1481!; Penang Hill, *R.*!; Balik Pulau, *R.* 12730!

DISTRIB. Siam.

The type sheet is *K.C.* 1673 in Kew Herbarium. The species has been confused with *C. membranaceus*, but differs from the latter in having coriaceous leaves not glaucous on lower surface but shiny on the upper, and in having larger flowers with different petals.

14. *CLEISTANTHUS PARVIFOLIUS*, Hook. f., 281. A tree, 10—13 m. high, with spreading branches, glabrous on all the vegetative

parts. *Branchlets* pale yellowish-brown, 2—4 mm. thick; internodes 1—2 cm. long; flowering twigs 1 mm. thick. *Laminae* membranous or thinly coriaceous, elliptical or oblong-ovate or oblong obovate, 4—9 cm. long, 1.5—3 cm. broad, with acute or subacuminate apex and rounded base; both surfaces somewhat dull, the upper dark olivaceous, obscurely reticulate, with indented midrib and slightly elevated nerves, the lower greenish-brown, with very slender nerves and prominent midrib; nerves 10—15, anastomosing near the margin; cross-nervules much broken up and scarcely distinct from the general open reticulation; ultimate nervules very fine, forming a close subquadrate reticulation; petiole subterete channelled above, 5 mm. long, transversely wrinkled; stipules not seen. *Flower-clusters* strung along the short lateral twigs, of few flowers, ♂ or ♀ only; bracteoles not seen. ♂ flowers not seen ♀ *perianth* seen in fruit only; sepals deltoid-lanceolate; petal obovate-spathulate, with subcrenulate or retuse apical margin, 1—1.5 mm. long, glabrous; disk glabrous; annulus not seen; ovary hirsute. *Capsule* sessile, hirsute at base and apex, otherwise glabrous, light-brown. *Seeds* not seen. Jabl. in Pflanzenreich, l.c. 11.

PERAK: Goping, K.C. 4540! the type sheet in Kew Herbarium.

15. *CLEISTANTHUS DECURRENS*, Hook.f. 278. A many-stemmed shrub, 3—6 m. high, with arched branches. *Branchlets* 2—4 mm. thick, pale yellowish-brown, glabrous, lenticellate; young twigs, very young leaves and buds + - rusty-tomentose or pubescent. *Laminae* subcoriaceous, oblong-elliptic or broadly lanceolate or oblanceolate, 7—17 cm. long, 2—7 cm. broad, with acute or acuminate apex and cuneate base narrowing subcaudately to the petiole; upper surface olivaceous, glabrous, subnitid, reticulate, lower dull green, glabrous or sparsely adpressedly scurfy on the midrib and nerves; the latter slender and slightly indented or upper, stouter and raised on lower surface; nerves 5—7, anastomosing near the margin; cross-nervules irregular and rather widely spaced; reticulation fairly open; petiole 5—6 mm. long, channelled above, closely transversely wrinkled, rusty-tomentose to glabrescent; stipules minute, triangular, + - rusty-pubescent. *Flower-clusters* strung along the lateral twigs, 3—4 mm. in diam., of ♂ and ♀ flowers mixed; bracteoles membranous, ovate, the inner ones rusty-tomentose, the outer ones glabrescent and dorsally carinate. ♂ flowers ovoid in bud, 3—4 mm. long, subsessile; calyx



glabrous or pubescent at the tip with lanceolate sepals; petals very shortly clawed, 1 mm. long, glabrous, obcuneate or obovate, with truncate or rounded erosulate apex; disk a broad fleshy glabrous annulus adherent to upper part of calyx cup; pistillode stout columnar, obscurely 3-ridged and obtusely trifid, caducously scurfy ♀ flowers sessile, conically ovoid in bud, 3—4 mm. long, with glabrous perianth and disk; sepals lanceolate; petals sessile, obovate, entire, 1 mm. long; annulus of disk narrow, membranous, sublobulate; ovary ovoid, densely hirsute; styles free, short, bifid stigmas spatheolate. Capsule on a 5—7 mm. long terete, glabrous or sparsely hairy pedicel, 7 mm. in vertical, 9 mm. in transverse diam. at first sparsely tomentose, later glabrous except for a few hairs at base and apex and in the sulci; cocci glabrous internally. Seed not seen. Jabl. in Pflanzenreich, l.c. 33.

PENANG: Batu Ferehgy, C. 3657!; PERAK: S. 1745!, 1916 x Goping, K.C. 476!; Larut, K.C. 4285!, 4637!

The type sheets are *Scortechini* 1745 and 1916, and K.C. 476, all in Kew Herbarium.

16. *CLEISTANTHUS MACROPHYLLUS*, Hook. f. 278. A tree 1-m. high, with spreading branches, glabrous on all vegetative parts. Twigs brown, 2—5 mm. thick. Laminæ thinly coriaceous, narrow to broadly oblong-ovate or elliptical or broadly lanceolate or oblanceolate, 14—30 cm. long, 5—10 cm. broad, with subcaudately acuminate apex and cuneate base; upper surface glossy deep-green when fresh, olivaceous and subnitid when dry, boldly reticulate, lower surface greenish-brown, sub-verniceous; midrib prominent on both surfaces, more so on lower; nerves 10, anastomosing near the margin; cross-nervules irregular, wide apart; reticulation somewhat bold and open; petiole 6—8 mm. long, corrugulate; stipule minute, caducous, lanceolate. Flower-clusters strung along the lateral-twigs, 6—7 mm. in diam., of numerous flowers, ♂ and ♀ mixed bracteoles ovate, acute, carinate, + - tomentose on outer surface, glabrous on inner. ♂ flower ovoid in bud, shortly pedicellate,



rounded or subtruncate, crenulate apex; disk projecting usually beyond the calyx-cup, thick, fleshy, lobulately dentate; annulus given off about halfway up, membranous; ovary ovoid, densely hirsute; styles short, stout, shortly bifid; stigmas irregularly clavate. *Capsule* on a stout, terete, glabrous, 8—1 cm. long, pedicel 9 mm. in vertical, 1.5 cm. in transverse diam., glabrous except for a few hairs at base and apex and in the sulci. *Seeds* seen only immature, ovoid, corrugulate, 7 mm. long, 5 mm. broad, 4 mm. thick. *Jabl.* in *Pflanzenreich*, l.c. 35.

PERAK: S. 1759!; Goping, K.C. 4314!, 6182!; SINGAPORE! Bukit Timah, R. 6478!, 6518!, 10,441!

The type sheet is *Scortechini* 1759 in Kew Herbarium.

17. *CLEISTANTHUS LANUGINOSUS*, *Jabl.* in *Pflanzenreich*, IV, 147; VII, 26; (1915). *Branchlets* dark-brown, irregularly scurfy-pubescent or glabrescent, 3—5 mm. thick; young twigs 2—3 mm. thick, densely fulvous-tomentose; internodes 1.5—3 cm. long. *Laminae* thinly coriaceous, elliptic-lanceolate, 12—22 cm. long, 4—7 cm. broad, with acuminate apex and cuneate base; upper surface olivaceous, glabrous or + — pubescent on midrib, subnitid, reticulate; lower surface dull, glaucous, villose especially on the prominent midrib, nerves and nervules glabrescent; nerves 10—12 anastomosing near the margin; cross-nervules rather distant, connected by a rather open network; ultimate reticulation visible only by transmitted light, close, subquadrate; petiole very stout, 8 mm. long, 2—3 mm. thick, densely fulvous-tomentose; stipules persistent, ovate acuminate to subulate, + — rigid, fulvous-tomentose at first, later glabrescent; 7—1 cm. long. *Flower-clusters* 1—1.5 cm. in diam., of few rather large flowers, ♂ and ♀ mixed; bracteoles rather large, ovate, acute or acuminate, + — hirsute and subcarinate on outer surface, glabrous on inner. ♂ *flowers* subsessile, ovoid in bud, turbinate when open, 7 mm. long; sepals deltoid or lanceolate, + — hirsute on outer surface, glabrous, on inner; petals subcuneately obovate, 1 mm. long, glabrous, apical margin irregularly dentate; disk lining the calyx cup, glabrous, entire; staminal column 3 mm. long, glabrous; pistillode ovoid, glabrous, 3-fid. ♀ *flowers* subglobose ovoid; calyx as in ♂; petals obovate subacute or subrhombic, subcrenulate, glabrous, 2 mm. long; annulus membranous; ovary subglobose ovoid, densely hirsute; styles connate below, short, slender, glabrous, shortly 2-fid; stigmas slightly subspathulately thickened. *Capsule* not seen mature, deciduously hirsute.

JOHOR: Mt. Ophir, *Hullett* 779!, the type sheet in Kew Herbarium.

18. *CLEISTANTHUS HIRSUTULUS*, Hook. f. 278. A tree, 10—14 m. high, with spreading branches. *Branchlets* brown, glabrous 2—3 mm. thick; flowering twigs 1 mm. thick, angled and grooved or subterete, rusty-tomentose; internodes 5—1.5 cm. long. *Laminae* membranous, obovate-oblong, 3.5—13 cm. long, 1.5—5 cm. broad, with subcaudately acuminate apex and rounded or obtusely cuneate base; upper surface olivaceous, subnitid, reticulate rusty-pubescent on basal half of midrib, otherwise glabrous; lower surface dull green, subglaucous, rusty-pubescent on midrib and basal margin, very sparsely adpressedly pubescent on nerves and general surface or glabrescent; midrib and nerves slender; nerves 10—15, anastomosing near the margin; cross-nervules irregular and often broken up by subsidiary lateral nerves; petiole scarcely 2 mm. long, rusty-pubescent; stipules persistent, acicular, 5 mm. long, rusty-pubescent. *Flower-clusters* strung along the twigs, of fairly numerous ♂ and ♀ flowers mixed; bracteoles ovate, acute, carinate and + — rusty-pubescent on outer, glabrous on inner surface. ♂ *flowers* fusiform in bud, 3 mm. long; calyx pubescent externally glabrous internally; sepals deltoid; petals shortly clawed, suborbicular, crenulate, 5 mm. long and broad; disk lining calyx cup, subrenulately margined; pistillode hirsute, ovoid, with subacute 3-fid apex. ♀ *flowers* 5 mm. long, fusiform in bud; calyx cup turbinate; sepals lanceolate, pubescent externally, glabrous internally; petals 1 mm. long, oblong-obovate, subcrenulate; annulus of the disk setulosely pubescent on outer surface; ovary globosely ovoid, densely hirsute; styles united for half their length, slender, terete, glabrous, 2-fid; stigmas slightly clavate. *Capsule* sessile, 9 mm. in vertical, 1.3 cm. in transverse diam., + — adpressedly rusty-pubescent. *Seeds* roughly ovoid, 5 mm. long and broad. *Jabl. in Pflanzenreich*, l.c. 26.

PERAK: *S.* 1260!, *K.C.* 7412!, 7453!; Goping, *K.C.* 4562!, 5870!; Sungei Larut, *W.* 2481!. PAHANG: *R.* 2299!. SINGAPORE: Bukit Timah, *R.* 6514!

As Hooker points out, this species is allied to *C. membranaceus*, but is distinguished from it by the more pubescent calyx, the different form of the petals, and the shiny upper surface of the leaves.

19. *CLEISTANTHUS PRAETERMISSUS*, Gage in Kew Bull. No. 7 1914, p. 240. *Branchlets* pale-straw, glabrous, pustulate, 2—4 mm.

thick. *Laminae* membranous, elliptical, lanceolate, 8—13 cm. long, 3—5 cm. broad, with long acuminate apex and acute or cuneate base; upper surface dark brown-olivaceous, glabrous, subnitid, obscurely reticulate; lower surface dull-brown, + — glaucous, + — hirsute on midrib and nerves, which are slender and prominent on lower, and indented on upper surface; nerves 6—8; cross-nervules somewhat distant and irregular, connected by an open reticulation; ultimate reticulation, visible only by transmitted light, close; petiole slender, glabrous, closely wrinkled, 5—6 mm. long; stipules not seen. *Flower-clusters* axillary and on short lateral spiciform twigs, small, of few flowers, ♂ or ♀ only; bracteoles minute, ovate, acute or acuminate, + — adpressedly hirsute and carinate on outer surface, glabrous on inner. ♂ *flowers* not seen. ♀ *flowers* sessile ovoid, with glabrous perianth; sepals deltoid or lanceolate; petal shortly clawed, subspathulately obovate, subcrenulate, 1.5 mm. long; disk and membranous annulus glabrous; ovary subglobose ovoid, hirsute; styles united at the base, short, subterete, glabrous shortly bifid; stigmas subspathulate. *Capsule* sessile, 8 mm. in vertical, 11 mm. in transverse diam., glabrous except for a few hairs at apex, base and in the sulci, black, polished, obscurely reticulate, *Seeds* brown and yellow mottled, smooth, 6 mm. long, 5 mm. broad and 4 mm. thick, with subacute apex and obtuse excavate base.

DINDING: Gunong Tungul, R. 9440!

20. *CLEISTANTHUS POLYPHYLLUS*, Williams in Bull. Herb. Boiss. 2<sup>me</sup> Ser. V; 31 (1905). A small bushy tree, 3—5 m. high, with numerous, closely-ranked, rather small leaves. *Branchlets* dark-brown, glabrous or scurfy-pubescent, 2—5 mm. thick; flowering twigs 1 mm. thick, + — rusty or yellowish-pubescent; internodes 5—2 cm. long. *Laminae* thinly coriaceous, broadly lanceolate or ovate or obovate, 5—8 cm. long, 1—3 cm. broad, with acute or shortly acuminate apex and rounded or subcuneate base; upper surface pale olivaceous to dark brown, subnitid, + — pubescent on midrib, otherwise glabrous, obscurely reticulate, with very slender midrib and nerves; lower surface dull, pale olivaceous to light-brown, + — glaucous, + — pubescent especially on the slender prominent nerves and midrib; nerves 5—7; petiole slender, hirsute, 2 mm. long; stipules persistent, subulate to finely aculeate, at first pubescent, then glabrous, 5—8 mm. long. *Flower-clusters* axillary and also spiciformly congested on short lateral twigs, of rather few and

large, 3—5 mm. long, lanceolate-aculeate, + — hirsute and carinate on outer surface, glabrous on inner. ♂ flowers ovoid, 4—5 mm. long; calyx hirsute externally, glabrous internally, with deltoid or sublanceolate sepals; petals rhombic, 1 mm. long and broad, subcrenulate, glabrous or with a few bristles externally in bud; disk lining calyx cup; pistillode subconically columnar, bluntly trifid, glabrous, minutely papillose. ♀ flowers ovoid, 6 mm. long; calyx hirsute externally, glabrous internally, sepals lanceolate-acuminate or almost aculeate; petals 1.5 mm. long, obovate, with truncate subcrenulate apical margin and a few bristles on outer surface; annulus of the disk first dentate, later obscurely lobed; ovary globosely ovoid, densely hirsute; styles united below, slender terete, glabrous, shortly bifid; stigmas slightly thickened. *Capsule* sessile, 7 mm. in vertical, 8 mm. in transverse diam., adpressedly hirsute. *Seeds* not seen. Jabl in Pflanzenreich, l.c. 24. *C. trichocarpa* Ridley in Journ. Roy. Asiat. Soc. Straits Br. No. 59, 167 and No. 61, 58.

SETUL: *R.* 14886!. PERLIS: *R.* 14885!. KEDAH: Langkawi, *C.* 2795!, 8306!; Bukit Penang, *R.* 14884!; Rawei Island, *R.* 15730!; locality illegible, *R.* 15731!; Burau Bay, *R.* 15793!. PENANG: Penang Hill, *R.* 10209!. PERAK: Trong, *K.C.* 1389!

The type sheet is *Curtis* 2795 in Kew Herbarium.

21. *CLEISTANTHUS MAINGAYII*, Hook. f., 280. *Branchlets* 2—3 mm. thick, pale to dark brown, + — rusty-pubescent; young lateral twigs 1 mm. thick, short, densely rusty-tomentose; internodes 5—1 cm. long. *Laminae* coriaceous, oblong-ovate or oblong-obovate, 4.5—12 cm. long, 2—5 cm. broad, with shortly caudately acuminate apex and rounded or almost subcordate base; upper surface glabrous subnitid, olivaceous, with rather obscure midrib nerves and reticulation; lower surface in young leaves densely rusty-tomentose, in older leaves glaucous or light dull brown, sparsely adpressedly pubescent, with prominent midrib, nerves and reticulation; nerves 6—8; cross-nervules irregular; petiole 3 mm. long, closely wrinkled, + — rusty-pubescent; stipules persistent, acicular, 4 mm. long, + — rusty-pubescent. *Flower-clusters* rusty-tomentose, of comparatively few sessile flowers ♂ or ♀ only; bracteoles broadly ovate, slenderly caudately acuminate, rusty-tomentose on outer, glabrous on inner surface. ♂ flowers elongate ovoid, 3—5 mm. long; calyx adpressedly hirsute; sepals lanceolate with acute, acuminate or aculeate, finally recurved apex; petals shortly clawed, 1 mm. long, subquadrate or broadly spatulate with subcrenulate apex, sparsely

bristly tomentose on outer surface, glabrous on inner; disk lining the calyx cup, thin, glabrous subcrenulate; pistillode columnar, subtrigonal, glabrous, obscurely 3-lobed. ♀ flowers subglobose ovoid or spindle-shaped in bud, 5 mm. long; calyx as in the ♂; petals 2 mm. long, broadly shortly clawed, ovate or obovate, subentire, sparsely hirsute on outer surface, glabrous on inner; annulus of the disk narrow, glabrous, membranous, sub-lobulate; ovary globose ovoid, densely hirsute; styles free, slender, short, adpressedly hirsute on outer surface, glabrous on inner, shortly bifid; stigmas recurved, subspathulately thickened. *Capsule* (seen only in fragments) about 1 cm. in both diameters, apparently sessile, sparsely and rather adpressedly tomentose. Jabl. in Pflanzenreich, l.c. 25.

PERAK: S.!. MALACCA: *Maingay* 1374!; Ayer Keroh, R.!

The type sheet is *Maingay* 1374 in Kew Herbarium.

22. *CLEISTANTHUS VESTITUS*, Jabl. in Pflanzenreich, IV, 147; VII, 32; (1915). *Branchlets* pale brown, cinereous or leprose glabrous, 4—7 mm. thick; flowering twigs 1—2 mm. thick, + — densely fulvous-tomentose; internodes .8—2 cm. long. *Laminae* membranous or thinly coriaceous, elliptic-lanceolate or oblanceolate 5.5—15 cm. long, 2.5—5.5 cm. broad, with long acuminate apex and acute or cuneate base; upper surface glabrous, brown; lower finely densely adpressedly cinnamon-pubescent; midrib and nerves slender obscure on upper surface, prominent on lower; nerves 6, directed with very slight curving forward and outward to the margin; cross-nervules numerous subparallel, close towards the base and often bifurcating; reticulation obscure; petiole 4—6 mm. long, densely fulvous-tomentose; stipules not seen. *Flower-clusters* axillary and also strung along the flowering twigs at short intervals, subglobose of rather few small flowers, ♂ or ♀ only; bracteoles minute, ovate, densely rufous-tomentose. ♂ *flowers* sessile, ovoid, glabrous, 3 mm. long; sepals lanceolate; petals obcuneate, scarcely 1 mm. long, with retuse or apiculate apical margin; disk lining the deep calyx cup glabrous; pistillode stout, columnar, 3-lobed, in bud caducously scurfy-hairy, finely papillose. ♀ *flowers* and *capsule* not seen. *Bridelia cinnamomea*, Hook. f. 273, in part.

PERAK: S. 1822!, 1823!. JOHOR: Muar, C. 3610!. SINGAPORE: Botanic Garden, R. 13463!.

DISTRIB.—Borneo, *Haviland* 800!.



See note under *Bridelia cinnamomea*. Jablonszky places the Peninsula specimens as a form of *C. vestitus*.

23. *CLEISTANTHUS KINGII*, Jabl. in Pflanzenreich, IV, 147; VIII, 40; (1915). A small tree, 3—5 m. high, with spreading branches. *Branchlets* pale brown, glabrous, 3—5 mm. thick; young twigs stramineous, glabrous; internodes 2—3 cm. long. *Laminae* coriaceous, ovate, 11—15 cm. long, 4—8 cm. broad, with acuminate apex and rounded to subcuneate base; upper surface green, glabrous, subnitid, reticulate; lower surface greenish-brown, dull, very finely and closely adpressedly velutino-se, reticulate; midrib and nerves slender; nerves 5—7; cross-nervules rather distant and irregular, sometimes scarcely distinguishable from the general open reticulation; petiole slender, glabrous, 7—8 mm. long, closely wrinkled stipules not seen. *Flower-clusters* few, of ♂ or ♀ flowers only bracteoles minute, ovate, entirely glabrous. ♂ flowers not seen. ♀ *perianth* seen only in fruit, sessile, ovoid; calyx entirely glabrous with lanceolate sepals; petals broadly subspathulately obovate shortly clawed, subcrenulate, .5 mm. long; disk and annulus glabrous; ovary not seen. *Capsule* on a stout, glabrous, 5—7 mm. long pedicel, 8 mm. in vertical, 1.1 cm. in transverse diam., glabrous.

PERAK: Larut, K.C. 3064!, 6863!.

The type sheets in Kew Herbarium.

24. *CLEISTANTHUS MYRIANTHUS*, Kurz For. Fl. 370 (1877). *Branches* 3—7 mm. thick, glabrous below, scurfy-pubescent higher up; young twigs 2—3 mm. thick, fulvous tomentose at first, later scurfy-pubescent; internodes .5—2.5 cm. long. *Laminae* coriaceous; lanceolate, 10—30 cm. long, 3.5—10 cm. broad, with acuminate apex and rounded base; upper surface glabrous, subnitid, olivaceous, reticulate; lower surface finely adpressedly velutino-pubescent-rusty to subsilvery; nerves 12—20; petiole 1 cm. long, + — fulvous or subsilvery tomentose, transversely wrinkled; stipules minute, adpressed, triangular, rusty-tomentose. *Flower-clusters* in the axils of leaves and branches, .5—1 cm. in diam., of numerous flowers, ♂ and ♀ mixed; bracteoles broadly ovate, fulvous-tomentose on outer surface, glabrous on inner, subfimbriate. ♂ flowers ovoid in bud, subsessile, 3—4 mm. long, glabrous; sepals deltoid; petals broadly obcuneate, .5 mm. long; pistillode conically ovoid, acute, trisulcate with trifid apex. ♀ flowers larger than the ♂, subsessile turbinate, 4—5 mm. long, glabrous; sepals deltoid or lanceolate;



petals very shortly clawed, obovate or subrhombic, acute, 1 mm. long; annulus entirely concealing the ovoid, glabrous ovary; styles united at the base, glabrous, very shortly bifid; stigmas clavellate. *Capsule* on a short stout pedicel, subglobose and 1 cm. in diam., glabrous, brownish-black. *Seeds* ovoid, compressed, black, glabrous, 5 mm. long, 4 mm. broad and 3 mm. thick. Hook. f. 275; Gamble, Man. Ind. Timbers, 2nd. edit. 598; Brandis, Ind. Trees, 561; Robinson in Philip. Journ. Sc. C. Bot. III, 190, Jabl. in Pflanzenreich, l.c. 37. *Nanopetalum myrianthum* Hassk. in Verh. Kon. Ac. Amster. XXIV, 140; Mull. Arg. 510.

SINGAPORE: Jurong, *R.* 3415!; Bukit Mandai, *R.* 3416!; Chu Chu Kang, *R.* 5986!; Kranji, *R.* 6515!.

DISTRIB.—Assam, Lower Burma, Andamans and Nicobars, Malayan Archipelago, Philippines.

25. *CLEISTANTHUS PSEUDOMYRIANTHUS*, Jabl. in Pflanzenreich, IV, 147; VIII, 41; (95). A small tree. *Branchlets* subterete, cinereous, glabrous, 1.5–4 mm. thick. *Laminae* coriaceous, oblong ovate or broadly elliptic, 8–4 cm. long, 3.5–6 cm. broad, with shortly caudately acuminate apex and subacute to rounded base; upper surface pale olivaceous, nitid, glabrous with slender midrib and nerves; lower surface dull, subargenteous, very minutely adpressedly pubescent, with larger but still very small ramentiform brownish hairs scattered + – over the surface especially near the prominent midrib and nerves or glabrescent; nerves 8–10; cross nervules subparallel to rather irregular; petiole subterete, 4 mm. long, transversely closely wrinkled, adpressedly fulvous tomentose at first, later glabrous; stipules lanceolate, 3 mm. long, entire sparsely adpressedly fulvous pubescent. *Flower-clusters* axillary rather few flowered, apparently ♂ and ♀ flowers in the same cluster, but ♂ flowers seen only in extremely minute bud; bracteoles broadly ovate or triangular, + – dorsally carinate, glabrous or minutely adpressedly sparsely pubescent on outer surface. ♀ flowers sessile; calyx 4 mm. long, split more than halfway down into 4–5 coriaceous ovate acute sepals, glabrous; petals spatulate, 2 mm. long, glabrous, with + – erosulate, obtuse or acute apex; disk annular membranous, erect, entire or almost so, glabrous, closely embracing basal half of the ovoid glabrous ovary; styles short, simple or very shortly bifid at apex. *Fruit* on a stout, 5 mm. long, glabrous, obconical pedicel; capsule seen only in pieces, apparently 1 cm. from

base to apex, glabrous; with exocarp + - reticulate on both surfaces. *Seed* broadly scarabaeoid, 5—6 mm. long and broad.

PERAK: Sungei Larut, W. 2486!, the type in Kew Herbarium.

26. *CLEISTANTHUS ELLIPTICUS*, Hook. f. 281. A shrub or tree; 10—14 m. high, with spreading branches. *Branchlets* 2—5 mm. thick pale-brown, glabrous or pubescent above; young twigs 2—3 mm. thick, + - rusty-pubescent; internodes 5—5 cm. long. *Laminae* coriaceous, elliptic-obovate or ovate, 6—24 cm. long, 3—10 cm. broad, with subacute or shortly caudately acuminate apex and cuneate base; upper surface dark green when fresh, olivaceous when dry, glabrous or rusty-pubescent on midrib, subnitid, obscurely reticulate; lower surface dull brown, sparsely very minutely adpressedly rusty-scaly pubescent or glabrescent; midrib and nerves evident on upper and prominent on lower surface; nerves 8; petiole 5—1 cm. long, rufous-tomentose to glabrescent; stipules not seen. *Flower-clusters* 1 cm. in diam., densely fulvous-tomentose, of ♂ or ♀ flowers only; bracteoles broadly ovate, densely rufous-tomentose on outer, glabrous on inner surface. ♂ *flowers* in bud ovoid, 3 mm. long; calyx rufous-tomentose externally towards the apex, glabrous internally; sepals deltoid lanceolate; petals flabelliform, crenulate, less than 1 mm. long and broad, glabrous; disk lining the calyx cup, entire; pistillode short, stout, columnar, trifold, densely hirsute. ♀ *flowers* with calyx of the ♂; petals obovate-spathulate, entire, 1 mm. long; annulus of the disk, membranous; ovary not seen. *Capsule* on a stout, glabrous, terete, 1 mm. long pedicel, subglobose, glabrous 1.1 cm. in both diameters. *Seeds* elongately ovoid, 8 mm. long, 5 mm. broad, 4 mm. thick, with convex subcarinate dorsal and ill-defined ventro-lateral surfaces, rounded apex and cordately excavate base. Jabl. in Pflanzenreich, l.c. 32.

PENANG: Batu Ferengy, C. 3657!. PERAK: Larut, K.C. 2018! 2080!, 2769!, 3739!, 3755!, 5162!; Assam Kumbong, W. 1930! Kota, W. 2547!; Trong, W. 2763!; Thaipeng, Burn Murdoch 173l.

The type sheet is K.C. 3739 in Kew Herbarium.

27. *CLEISTANTHUS RUFUS* (Hook. f.), Gehrm. Bot. Jahr. buch. XLI, Beibl. No. 95, 42 (1908). A sparingly branched shrub, 3—4 m. high. *Branchlets* terete, 2—5 mm. thick, pale yellowish brown, glabrous below, scurfy rusty pubescent higher up; internodes 5—3.5 cm. long. *Laminae* membranous or thinly coriaceous

ovate or obovate, 10—17 cm. long, 4—6·5 cm. broad, with abruptly shortly acuminate apex and rounded to subcuneate base; upper surface at first fulvous tomentose, later glabrous or pubescent only on the slender midrib and nerves, dark olivaceous, finely obscurely reticulate; lower surface dull brown, + — rufous pubescent especially on the prominent nerves and midrib; nerves 8—9; cross nervules numerous, close, subparallel, connected by smaller, less regular secondary nervules; reticulation fine; petiole stout, subterete, + — rusty tomentose, 4—5 mm. long; stipules minute, caducous. *Flower-clusters* axillary, densely rufous tomentose, 4—5 mm. in diam., of many minute flowers, ♂ and ♀ mixed, and almost entirely concealed by the bracteoles, that are broadly ovate, densely scurfy rufous tomentose on outer surface and glabrous on inner. ♀ *flowers* sessile, ovoid, 2·5 mm. long; calyx glabrous except for caducous scurfy rusty tomentose tufts on outer surface of apex, divided about halfway down into ovate or deltoid lobes; petals subquadrate, glabrous, ·5 mm. long and broad, with subcrenulate apical margin; disk subentire; pistillode subtrigonal, sparsely caducously scurfy pubescent, with trifid apex. ♀ *flowers* sessile, ovoid or fusiform in bud, 2—3 mm. long; calyx as in the ♂; petals oblong spatulate, glabrous, ·5 mm. long, with subcrenulate apical margin; annulus of the disk membranous, irregularly dentate; ovary globose ovoid, caducously densely hirsute, the entire hairy coat being readily removed, leaving the ovary glabrous; styles united for some distance, slender, short, subterete, glabrous, shortly bifid; stigmas slightly thickened. *Capsule* on a 4 mm. long, terete, glabrous pedicel, 8 mm. in vertical and 1 cm. in transverse diam., glabrous, subnitid, reticulate. *Seeds* not seen mature. Jabl. in Pflanzenreich, l.c. 32. *Bridelia rufa*, Hook. f. 273.

PENANG: 30—120 m. K.C. 1351!; Waterfall, C. 1480!

### 3. ACTEPHILA, Bl.

Shrubs or trees, with simple, alternate, petiolate, stipulate, entire, penninerved leaves; lateral nerves of the laminae curved slightly outwards and forwards to inarch near the margin; nervules irregular; reticulation irregularly polygonal, fairly close. *Flowers* monoecious, petaliferous, axillary, in closely imbricatingly bracteolate nodules or very small racemules, pedicelled, ♂ and ♀ in the same axil or in different axils; calyx of both sexes 5-fid almost to the base, the sepals entire imbricate in bud persistent in the ♀;

petals 5 in both sexes, much smaller than the sepals and attached just external to the disc; stamens 5, within the disc, surrounding a central trifid pistillode, filaments free or united only at the base anthers adnate, loculi parallel; disc in both sexes a shallow cup or ring, thinly fleshy, with  $\pm$  crenulate margin, glabrous; ovary sessile on the disc, subglobose, 3-locular, the loculi 2-ovuled, glabrous or tomentose; styles 3, minute, free or united at the base, thick, entire or bifid, persistent. *Fruit* a dry 3-coccate capsule, loculicidal or the cocci breaking into 2 valves, leaving a central columella. *Cocci* 1—2-seeded. *Seeds* triquetrous, rather large, with convex dorsum and 2 plane lateral surfaces meeting at an acute angle; testa thin; albumen scanty or 0; cotyledons fleshy, conduplicate. Species about 10, distributed from Southern and Eastern India to the Malayan Archipelago and Australia.

♀ sepals 1—2 cm. long; ovary tomentose .. .. 1. *A. ovalis*.

♀ sepals only a few mms. long; ovary glabrous.

Lamina relatively small, rarely longer than 17 cm. or

broad .. .. 2. *A. excelsa*.

Lamina relatively large, up to 30 cm. long and 9.5 cm.

broad .. .. 3. *A. javanica*.

1. *ACTEPHILA OVALIS* (Ridley), Gage in Rec. Bot. Surv. Ind., IX, No. 2 (1922), 219. A ? shrub or ? tree. *Branchlets* at first angled and grooved, later subterete, 2—4 mm. thick,  $\pm$  minutely puberulous, brown; internodes a few mms. to 5 cm. long. *Laminae* elongate ovate or obovate or lanceolate, membranous, 6—15 cm. long, 2—6 cm. broad, with obtuse apex in obovate laminae acuminate in others, base cuneate or subcuneate, glabrous on both surfaces, subnitid and pale green to olivaceous on the upper, dull and paler on the lower; midrib slender on both surfaces; nerves 12—16; reticulation delicate; petiole slender, 2—4 mm. long, glabrous or with a few minute hairs; stipules membranous, broadly lanceolate, 2—2.5 mm. long, glabrous or with a few minute hairs on outer surface. *Male* inflorescence not seen. *Female* inflorescence of solitary flowers in the axils; pedicels 4—6 cm. long, slender, slightly thickening towards the calyx, glabrous or with a few minute hairs near the calyx; calyx spreading, 2.5—4.4 cm. across; sepals slightly unequal, membranous or subscarious, broadly ovate, acute, 1—2 cm. long, .6—1.5 cm. broad, sparsely puberulous and obscurely glandular or eglandular at the base, with midrib and 3—4 nerves radiating from the base on each side of the midrib, and with clear dendritic reticulation; petals minute, membranous, distant, ovate or obovate

1 mm. long, with obtuse entire or erosulate apex; disc annular 1 mm. broad, shallowly subcrenulate; ovary obtusely trigonously ovoid, 2 mm. in diam., densely fulvous tomentose, externally, glabrous internally; styles united at the base, entire, spreading, 2.5 mm. long, fleshly subulate, with subcapitate, slightly recurved stigmatic apex. *Capsule* about 1.5 cm. from base to apex; cocci minutely sparsely adpressedly pubescent, breaking into 2 valves; epicarp and mesocarp coriaceous, with inner surface of mesocarp reticulately rugulose; endocarp crustaceous, finely rugulose on inner surface. *Seeds* subcordately ovoid, 1 cm. long and broad, 6 mm. thick, with crustaceous smooth obscurely mottled testa. *Dimorphocalyx ovalis* Ridley in Journ. Straits Br. Roy. Asiat. Soc. No. 50, 178 (1911).

PERLIS: Kanya, R. 14890!. LANGKAWI: Coah, C.!

This remarkable species has a deceptive resemblance to a *Dimorphocalyx* but the 2-ovuled loculi and the absence of albumen, with the presence of the outerplicated cotyledons declare it an *Actephila*.

2. *ACTEPHILA EXCELSA*, Mull. Arg. in *Linnaea* XXXII, 73 (1863).

A shrub. *Branchlets* 1.5—3 mm. thick, pale brown, glabrous or  $\pm$  minutely hirtellous; internodes .5—3 cm. long. *Laminae* elliptical lanceolate, thinly coriaceous, 6—17 cm. long, 1.8—4.5 cm. broad, with acute or acuminate apex and cuneate or subcuneate base, glabrous on both surfaces, subnitid on upper, dull on lower; nerves and midrib slender; nerves 10—12; reticulation fairly clear petiole 3—4 mm. long, stoutish, glabrous or sparsely hirtellous; stipules deciduous, scarious, lanceolate, 2—3 mm. long, entire, glabrous or with a few minute hairs on outer surface. *Male flowers* usually several in an axil, females several or solitary; bracteoles broadly ovate, entire, 1—2 mm. long and broad, membranous,  $\pm$  concave, with a few minute hairs on the outer, glabrous on the inner surface; male flower pedicels slender, subterete, 5—6 mm. long, thickening towards the calyx,  $\pm$  sparsely hirtellous; male calyx subcampanulate, 3 mm. long, sepals somewhat unequal, oblong ovate or broadly lanceolate,  $\pm$  sparsely minutely adpressedly hairy on outer glabrous on inner surface; petals narrowly spatulate, glabrous, entire, 1—1.5 mm. long; disc annular, crenulate; stamens free; pistillode columnar. *Pedicel* of female flowers slender, up to 5 cm. long thickening gradually to the calyx, glabrous or with a few minute adpressed hairs; perianth and disc as in the male but somewhat



larger; ovary subglobose, glabrous; styles minute, very short, stout, glabrous, bifid, with subcapitate stigmatic apices. *Capsule* depressed slightly, 1.5—2 cm. in transverse and 1—1.3 cm. in vertical diameter, glabrous, slightly rough, obscurely veined, the cocci breaking into 2 valves; pericarp crustaceous, scarcely 1 mm. thick; endocarp glabrous, nitid and finely rugulose within. *Seeds* triquetrous, 1 cm. long, with a very convex dorsum, and 2 plane lateral surfaces meeting at an acute angle. Mull. Arg., 222. Hook f., 282.

PERAK: Larut, K.C. 7166!; Tambin, R. 9592!

SELANGOR: Kwala Lumpur, C. 2379!; Gua Batu, R. 8530!.

SINGAPORE: Sungei Morai, R. 1.

3. *ACTEPHILA JAVANICA*, Miq. Fl. Ind. Bat. 1, 2, 356 (1859).

A small tree. *Branchlets* subterete 2—5 mm. thick, at first minutely sparsely hirtellous, then glabrous; internodes 1—4 cm. long. *Laminae* thinly coriaceous, oblong elliptical, lanceolate or oblanceolate, 6.5—30 cm. long, 2.2—9.5 cm. broad, glabrous, with shortly caudately acuminate apex and subcuneate base, subnitid on upper, dull on lower surface, with slender nerves and midrib; nerves 7—12; reticulation clear; petiole somewhat slender, slightly thickened at both ends, grooved on upper surface, .8—5 cm. long, glabrous or sparsely hirtellous; stipules triangular, entire, acute 3—4 mm. long,  $\pm$  puberulous on outer, glabrous on inner surface. *Flowers* in closely imbricatingly bracteolate nodules or very short racemules,  $\sigma$  and  $\varphi$  in the same or different axils; bracteoles triangular, 1 mm. long and broad, entire, glabrous,  $\pm$  concave,  $\sigma$  flower pedicels 3—5 mm. long, terete, glabrous or sparsely minutely hirtellous; calyx subglobose in bud, 2 mm. in diam.; sepals oblong, subequal, glabrous, 2—4 mm. long; petals membranous broadly spatulate, with a very short claw and rounded  $\pm$  erosulate apex; disc subangular, crenulate; pistillode cylindrical, deeply 3-fid, with apices subpeltate and  $\pm$  ciliolate.  $\varphi$  flowers larger than the  $\sigma$ ; pedicels slender, up to 4 cm. long, thickening towards the calyx; perianth as in the  $\sigma$  but sepals larger and bearing on inner surface at the base a transverse series of minute pellucid glands, disc crenulately 5-lobed; ovary trigonously globose, somewhat depressed, glabrous; styles connate at the base, very short, thick 2 fid, the branches with capitate stigmatic apex. *Capsule*  $\pm$



depressed, subglobose, 1.5 cm. high, 2.3 cm. broad, breaking into 3 bivalved 1—2-seeded cocci. *Seed* 1.25 cm. long, with obscurely striate and mottled testa. Mull. Arg., 222; Hook. f., 283; J. J. Smith, 46.

PENANG: West Hill, C. I. SELANGOR: Batu Caves, R. 13,375! SINGAPORE: *Anderson* 170!; Garden Jungle, R. 402!, 403!

In addition to these species *K.C.* No. 5073 collected in Larut Perak seems a new species of *Actephila*, but the material is too imperfect for description.

#### 4. ANDRACHNE, Linn.

Shrubs or suffrutescent herbs with erect or decumbent branches, glabrous or sparsely hairy. *Leaves* alternate, simple, petiolate, stipulate, entire, penninerved or  $\pm$  distinctly 3-nerved. *Flowers* monoecious, axillary, pedicelled, the  $\sigma$  often fasciculate, the  $\varphi$  solitary; calyx of both sexes divided into 5—6 sepals imbricate in bud; petals as many as sepals, smaller, in  $\varphi$  flowers minute; disk usually of membranous glands, entire or bilobed, free or variously connate. *Stamens* 5—6, alternate with the petals; anthers erect subglobose, with parallel loculi; pistillode central, minute; cylindrical, entire or 3-partite. *Ovary* subglobose, substipitate, trilocular; styles 3, connate below, bifid above; stigmas subcapitate. *Fruit* a capsule of 3 bivalved 2-seeded cocci; seeds curved, exarillate, ecarunculate, albuminous; cotyledons broad, flat.

Species about 20, variously distributed in Europe, Asia, Africa and N. America.

ANDRACHNE FRUTICOSA, Dene. (non Linn.) in Nouv. Ann. Mus. III, 484 (1834).

A small erect branched shrub, 3—6 m. high. *Stem* terete, 2 mm. thick, pale brown, sparsely shortly hirsute or glabrescent, sparingly alternately branched; branches like the stem but more slender; internodes 5—2.5 cm. long. *Laminae* ovate or obovate, membranous, 3—9 cm. long, 1.5—4 cm. broad, with acute apex, cuneate base and entire margin; upper surface pale green, with slender midrib and nerves, sparsely adpressedly hirsute at first, then glabrous or sparsely hirsute on midrib; lower surface paler green, subglaucous, with slightly prominent midrib and nerves, sparsely adpressedly hirsute; nerves 3—4, subopposite or alternate, curved forward and outward to inarch with each other near the margin; reticulation delicate, irregularly polygonal; petiole slender, subterete, + - hirsute, 5—2 cm. long; stipules.....  $\sigma$  flowers

minute, on filiform, hirsute or glabrous, .5—1 cm. long pedicels, calyx cupular, 1 mm. long and broad, divided almost to base into 5 oblong ovate or obovate sepals, sparsely hirsute on outer surface glabrous on inner; petals much narrower than sepals, spatulate hyaline, .5 mm. long, glabrous; disk of as many pairs of glands as sepals and opposite the latter; the glands linear, submembranous, glabrous, half as long as the sepals; stamens free, with very filiform glabrous filaments half as long as the sepals; anthers minute, subquadrately ovate; pistillode central, of several, minute, subterete lobes. ♀ flowers larger than the ♂, on slender hirsute pedicels that may reach 1 cm. in length; calyx 4 mm. long, otherwise as in the ♂; petals 0 or very minute; disk glands opposite the sepals, short, obovate, bluntly bilobulate; ovary globose ovoid, hirsute, 1.5 mm. in vertical, 2 mm. in transverse diam., styles glabrous, less than 1 mm. long, bifid almost to the base; stigmas clavellate. Capsule subglobose, depressed, hirsute, 4 mm. in diameter. Seeds triquetrous, 1.5 mm. long, 1 mm. thick, with longitudinally curved dorsal and 2 plane lateral surfaces, all transversely plurisulcate, glabrous and dark brown. Mull. Arg., 235; Hook f., 284 and Ic. Plant. XVIII t. 1704. *A. Decaisnei* Bth. Fl Austral. VI, 88.

PERLIS: Tebeng Tinggi, *R.* 14883!. KEDAH: Langkawi, *C* 2540!.

PERAK: Larut, *K.C.* 2383!; Gunong Pondo, *K.C.* 8336!. SELANGOR: Kwala Lumpa, *Kelsall*!; Gua Batu, *R.* 8203!.

DISTRIB.—Siam, Malayan Archipelago, Philippines, Australia.

*Andrachne fruticosa* was the name originally given by Linnaeus to the species now known as *Breynia patens* Bth. Decaisne in 1834 published the description of a species from Timor under the name "*Andrachne fruticosa* L." assuming incorrectly that it was the plant of Linnaeus. As the plant of Linnaeus was not an *Andrachne* while Decaisne's plant was, J. Muller in DC Prodr. XV, II, 235 (1886) retained Decaisne's name and applied it to Decaisne's plant. The Malayan Peninsula specimens agree with Decaisne's plant. Hooker f. in Ic. Plant. xviii, t. 1704 does not agree with Müller, who placed Cumming's Philippine specimens under *A. australis*. Hooker considers part if not all of *A. australis* Mull. Arg. as *A. fruticosa* Dene. Hooker also rejects, which I think good reason, Bentham's name of *A. Decaisnei* in the Flora of Australia.

##### 5. AGYNEIA L.

Annual or perennial ascending or procumbent herbs with diffuse angled or compressed stems and alternate stipulate leaves. Inflorescence of monoecious apetalous flowers in axillary fascicles

usually one ♀ and several ♂ flowers in an axil. *Flowers* small shortly pedicelled; calyx of both sexes 6-partite or the ♀ calyx 5-partite and persistent; sepals imbricate in bud. *Disc* of ♂ flowers extra-staminal, of 5—6 somewhat elongate subpetaloid lobes opposite the sepals; stamens forming a central column with an enlarged trigonous apex; anthers sessile, attached to the angles of apex of column, with parallel loculi, extrorse, dehiscing longitudinally; pistillode absent. ♀ flowers without a disc; ovary when young turbinate, with a thick rather fleshy apex; styles 3, short, bifid, with incurved stigmas; loculi 3, each 2-ovuled; later the apex of ovary becomes excavate with a 6-lobulate margin and the styles sunk in the cavity. *Fruit* an ovoid dry dehiscent capsule on the persistent calyx; cocci 3, bivalved, 2-seeded, breaking away from a central columella. *Seeds* narrowly triquetrous, curved along their length; albumen fleshy; cotyledons plane.

**DISTRIB.** 2 species, distributed to India, Malaya and Mauritius.

**AGYNEIA BACCIFORMIS**, Ad. Juss. Tent. Euph., 24 (1824).

An annual or perennial glabrous herb, up to 40 cm high. *Root* ± vertical, subterete, tortuous, woody, 2 mm. thick. *Stems* alternately or dichotomously branched, slender, subterete or subangular internodes 5—5 cm. long. *Laminae* ovate to linear-lanceolate membranous, 1—3 cm. long, 2—1.2 cm. broad, with acute apex, subacute cuneate or obtuse base and entire margin; nerves 5, slender, obscure, inarching near the margin; reticulation obscurely polygonal; petiole 1 mm. long; somewhat flattened; stipules 1 mm. long, aculeolate. ♂ *flowers* very minute; sepals oblong ovate truncate, subtrilobed with inflected apex. ♀ *flowers* very shortly pedicelled; calyx 2 mm. deep; sepals 5—6, subequal, ovate, acute gland dotted and margined with white. *Capsule* subglobose ovoid, obtusely trigonous, 5 mm. high, 4 mm. thick, reddish-brown; cocci slightly carinate. *Seeds* light brown, with tetragonous tuberculate base, acute trigonous apex, and ventral angle truncate for some distance, and with a longitudinal hilar excavation. Mull. Arg. 238; Hook. f. 285.

**PAHANG:** Kwala Pahang, R. 1. **SINGAPORE:** Tanjong Katong, R. 1. **DISTRIB.** India, Ceylon, Java, Mauritius.

#### 6. FLUGGEEA, Willd.

Unarmed or spinescent shrubs, with small alternate entire petioled penninerved leaves. *Flowers* dioecious, small, in basally

minutely multi-bracteolate axillary fascicles, apetalous, males often numerous, females usually few in a fascicle. *Calyx* of both sexes similar, deeply 5-partite, with sepals imbricate in bud. *Stamens* 5 or sometimes fewer, free; anthers erect, extrorse, with parallel loculi and longitudinal dehiscence; disc in the ♂ of minute glands alternating with the stamens; pistillode 2—3-partite. *Ovary* 3-locular, seated on an annular disc, the loculi 2-ovuled; styles 3, basally connate, recurved or spreading, 2-partite, the branches entire or bifid. *Fruit* baccate or breaking into 2-valved cocci. *Seeds* triquetrous; albumen rather scanty; embryo incurved, with broad flat cotyledons. **DISTRIB.** About 6 species in Tropical Africa and Asia.

*FLUEGGEA VIROSA*, Baill. Et. Euphorb. 593, t. xxvi, f. 39 (1858).

*Branchlets* divaricate glabrous, .5—2 mm. thick, quadrangular, ribbed, brown, ± lenticellate; internodes .5—2 cm. long. *Laminae* ovate, oblong ovate or obovate, membranous, 1.5—4 cm. long, .8—2.2 cm. broad, with rounded to subacute apex, entire margin and acute base, glabrous and dull on both surfaces, glaucescent on the lower; midrib nerves and nervules slender; nerves 6—9, curved outwards and forwards to inarch near the margin; nervules irregular; reticulation irregularly polygonal, close; petiole slender, glabrous, subterete, 3—6 mm. long; stipules triangular, acute, glabrous, 2—2.5 mm. long. *Bracteoles* of fascicles ovate or triangular, membranous, glabrous, .5—1 mm. long. ♂ *flowers* on terete, glabrous, 2—4 mm. long pedicels; calyx obovoid in bud; sepals subequal, oblong ovate or obovate, .7—1 mm. long, membranous, glabrous, with minutely erosulate apical margin; glands fleshy, ± angled; pistillode conspicuous, glabrous, deeply 3-fid, the branches with recurved dilated and ± divaricately bifid apex. ♀ *flowers* on glabrous terete .7—3 mm. long pedicels; calyx 4—5-partite, the sepals unequal, ovate 1—2 mm. long, entire or ± erosulate; disc thinly fleshy, crenulate; ovary pyriform, glabrous; styles loricate, deeply bifid. *Fruiting* pedicel filiform, 2.5—3.5 cm. long; fruit indehiscent, depressed globose, white, 5—8 mm. in diam., with fleshy mesocarp. *Seeds* 1.7—2.4 mm. long. Hook. f. 328; J. J. Smith 51; Fl. Trop. Africa, VI, Sect. I. Pt. IV, 736.

**KEDAH:** *K.C.* 700!; Sungei Ryah, *K.C.* 99!. **DISTRIB.** Tropical Africa, Asia and Australia.

## 7. PHYLLANTHUS, L.

Herbs, shrubs or trees. *Leaves* varying much in size and shape alternate, reduced to minute scales on the primary branches, distichous on the branchlets, with entire laminæ, penninerved, equilateral or inequilateral, shortly petioled, stipulate. *Flowers* usually monoecious, apetalous, discigerous, small, axillary, solitary or glomerate or in minute glomeriform racemules ♂ *calyx* 4—6-partite, the sepals imbricate in 2 series, ± ovate, entire or ± fimbriate, disc rarely a narrow membranous lobed ring, usually of 4—6 minute, subreniform or amorphous scalelike glands alternate with the sepals, androecium of 2—5 stamens, the smaller number usually united in a short central column, the larger number free and ± diverging or the inner 2—3 ± connate by their filaments; anthers minute, ovate, sessile on the column and didymous or subhorizontal or basifix and diverging with free filaments or connivent with connate filaments; connectives not or slightly or rarely moderately produced; pistillode 0. ♀ *calyx* with 5—7 sepals, often larger than the male but otherwise resembling it; disc of minute fleshy scales or a membranous crenulate or lobed ring or shallow cup; ovary subglobose ovoid or turbinate, glabrous or ± puberulous, 3-locular or (in two Malayan Peninsula species) 4—9-locular; ovules 2 in each loculus, collateral in the 3-locular ovaries, partially superposed in the 4—9-locular ovaries; styles as many as the loculi, simple in the 4—9-locular ovaries, bifid in the 3-locular ovaries, free or ± connate. *Fruit* a small berry (in two species) or usually a subglobose dry septifragally dehiscent 3-locular capsule, glabrous or ± puberulous or echinate, small or moderately sized or rather large and inflated. *Seeds* triquetrous, varying much in size, with a convex dorsal and 2 ventro-lateral plane surfaces, granulate or minutely tubercled or striate or pitted or transversely or longitudinally ridged; testa crustaceous; albumen fleshy; cotyledons flat or flexuous.—DISTRIB. About 400 species, throughout the tropics and subtropics.

Even with *Glochidion* separated off, *Phyllanthus* still remains a somewhat mixed genus, and a re-elevation of some of its sections to generic rank would probably be an advantage. The scope of this account of the Malayan Peninsula species does not justify me in intrenching on the work of the monographer, and so here the genus as treated in the Flora of British India has as regards its sections been left undisturbed.

Hooker's statement (Fl. Brit. Ind. V, 286) that the ♂ flowers in the *Emblica* section have no disc requires qualification, as his own species *P. pectinatus* has

distinct glands in the ♂ flowers. Ridley (Trans. Linn. Soc. 2nd Ser. III, Bot. 345) records *P. maderaspatensis* L. from the sea shore at Kwala Pahang. I have however seen no specimen of that species in the herbaria of Kew, Singapore, Penang, and Calcutta from the Malayan Peninsula. *P. Emblica* L. is stated in the Flora of British India to be distributed as far south as Malacca, but I have seen no specimens in the herbaria mentioned above. *P. acutus* Wall. Cat. 7931, Herb. Finlayson (Fl. Brit. Ind. V, 301), does not appear to occur in the Malayan Peninsula. Finlayson's collections were made in Siam and Cochinchina and were taken to Calcutta by Wallich when the latter returned from his visit to Penang in 1823.

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# INDEX

## TO VOLUME LXXV.

### A

*Acalyphææ*, 474.  
*Acanthaceæ*, 1.  
*Achyranthes*, 16.  
*Achyranthes aspera*, Linn, 16.  
*Achyranthes atropurpurea*, 14.  
*Achyranthes ? cornosa*, 14.  
*Achyranthes lappacea*, 14.  
*Achyranthes nodiflora*, 8.  
*Achyranthes prostrata*, 12.  
*Achyranthes triandra*, 17.  
*Acroclidiææ*, 67.  
*Actephila*, 472, 474, 477, 479, 480, 482, 518.  
*Actephila excelsa*, 516, 520.  
*Actephila javanica*, 516, 521.  
*Actephila ovalis*, 516.  
*Actinodaphne*, 112.  
*Actinodaphne Blumei*, 187.  
*Actinodaphne cuspidata*, 113, 122.  
*Actinodaphne glomerata*, 113, 116.  
*Actinodaphne Hullettii*, 113, 120.  
*Actinodaphne johorensis*, 113, 117.  
*Actinodaphne Maingayi*, 112, 114.  
*Actinodaphne Maingayi*, var. *elliptica*, 115.  
*Actinodaphne malaccensis*, 113, 118.  
*Actinodaphne montana*, 113, 117.  
*Actinodaphne oleifolia*, 113, 121.  
*Actinodaphne fragilis*, 113, 123.  
*Actinodaphne pruinosa*, 113, 119.  
*Actinodaphne pruinosa*, var. *Kunsteri*, 120.  
*Actinodaphne Ridleyi*, 113, 118.  
*Actinodaphne sesquipedalis*, 112, 113.  
*Aerua* Forsk, 15.  
*Aerua Curtisii*, 15.  
*Aetanthus hexagyna*, 312.  
*Agallochum Secundarium*, 265.  
*Agrostistachys*, 474, 480.

*Agyneia*, 472, 477, 523.  
*Agyneia bacciformis*, 524.  
*Alchornea*, 475, 479, 481, 483, 484.  
*Aleurites*, 473, 478, 480, 483.  
*Allmania*, 4, 7.  
*Allmania nodiflora*, 8.  
*Allmania nodiflora*, var. *esculenta*, Br., 8.  
*Allmania nodiflora*, var. *procumbens*, 8.  
*Alseodaphne*, 88.  
*Alseodaphne bancana*, 88, 91.  
*Alseodaphne ? costalis*, 96, 181.  
*Alseodaphne crassipes*, 89, 95.  
*Alseodaphne decipiens*, 91.  
*Alseodaphne ? grandis*, 65, 109.  
*Alseodaphne insignis*, 93.  
*Alseodaphne lucida*, 96.  
*Alseodaphne paludosa*, 88, 92.  
*Alseodaphne panduriformis*, 102.  
*Alseodaphne pendulifolia*, 89, 95.  
*Alseodaphne peduncularis*, 88, 89.  
*Alseodaphne petiolaris*, 88, 91.  
*Alseodaphne Ridleyi*, 88, 94.  
*Alseodaphne umbelliflora*, 98.  
*Alseodaphne Wrayi*, 88, 90.  
*Alternanthera*, 17.  
*Alternanthera denticulata*, 17.  
*Alternanthera prostrata*, 17.  
*Alternanthera sessilis*, 17.  
*Alternanthera triandra*, 17.  
*Amanoa tomentosa*, 488.  
*Amarantaceæ*, 2, 3.  
*Amarantus*, 4, 9.  
*Amarantus Alopecurus*, 10.  
*Amarantus caudatus*, 9, 10.  
*Amarantus cruentus*, 10.  
*Amarantus fasciatus*, 11.  
*Amarantus gangeticus*, 9, 10.  
*Amarantus lanceolatus*, 11.  
*Amarantus lividus*, 11.  
*Amarantus melancholicus*, 11.

*Amarantus oleoraceus*, 11.  
*Amarantus polygamus*, 11.  
*Amarantus polystachyus*, 11.  
*Amarantus spinosus*, 9, 10.  
*Amarantus tricolor*, 11.  
*Amarantus tristis*, 11.  
*Amarantus viridis*, 9, 11.  
*Ampelgynum chinense*, 22.  
*Andrachne*, 472, 477, 522.  
*Andrachne australis*, 523.  
*Andrachne Decaisnei*, 523.  
*Andrachne pruticosa*, 522, 523.  
*Antidesma*, 473, 480, 482.  
*Apama*, 24.  
*Apama corymbosa*, 24, 25.  
*Apama tomentosa*, 18, 25.  
*Apama tomentosa*, var. *lanuginosa*, 26.  
*Aperula oxyphylla*, 197.  
**Apollonieæ**, 51.  
*Aporosa*, 473, 481, 483.  
*Aquilaria*, 257.  
*Aquilaria hirta*, 264, 265.  
*Aquilairia malaccensis*, 264.  
*Aquilaria ovata*, 265.  
*Arculus Duthieanus*, 368.  
**Aristolochiaceæ**, 2, 23.  
*Aristolochia*, 24, 29.  
*Aristolochia acuminata*, 31.  
*Aristolochia curtisii*, 32.  
*Aristolochia minutiflora*, 30, 31.  
*Aristolochia minutiflora*, var. *dolabrata*, 32.  
*Aristolochia Roxburghiana*, 31.  
*Aristolochia Tagala*, 30.  
*Ascarina serrata*, 34.  
*Asiphonina piperiformis*, 25.

## B

*Baccaurea*, 473, 482, 483.  
**Balanophoraceæ**, 393, 395.  
*Balanophora*, 395, 396.  
*Balanophora gigantea*, 396.  
*Balanophora globosa*, 396, 397.  
*Balanophora insularis*, 396, 398.  
*Balanophora multibracteata*, 396, 397.  
*Balanophora truncata*, 396, 398.

*Baliospermum*, 479.  
*Baratranthus bicolor*, 359.  
*Baratranthus Kingii*, 358, 359.  
*Baratranthus Leobonii*, 358, 359.  
*Baratranthus scortechinii*, 359.  
*Beilschmiedia*, 51.  
*Beilschmiedia curtisii*, 52, 55.  
*Beilschmiedia Foxiana*, 53, 61.  
*Beilschmiedia insignis*, 52, 53.  
*Beilschmiedia Kunstleri*, 52, 54.  
*Beilschmiedia longipes*, 52, 58.  
*Beilschmiedia lumutensis*, 52, 56.  
*Beilschmiedia Maingayi*, 52, 57.  
*Beilschmiedia Malaccensis*, 52, 54.  
*Beilschmiedia membranacea*, 53, 60.  
*Beilschmiedia pahangensis*, 53, 61.  
*Beilschmiedia penangiana*, 53, 60.  
*Beilschmiedia perakensis*, 52, 59.  
*Beilschmiedia Scortechinii*, 52, 56.  
*Bischofia*, 481, 482.  
*Blitum prutescens*, 6.  
*Blumeodendron*, 481.  
*Boerhaavia*, 2.  
*Boerhaavia diffusa*, 3.  
*Boerhaavia procumbens*, 3.  
*Boerhaavia repens*, 3.  
*Botryophora*, 481.  
*Bragantia corymbosa*, 25.  
*Bragantia khasiana*, 26.  
*Bragantia latifolia*, 26.  
*Bragantia melastomaeifolia*, 25.  
*Bragantia n. sp.*, 26.  
*Bragantia tomentosa*, 26.  
*Breynia*, 472, 477.  
*Bridelia*, 472, 477, 484.  
*Bridelia cinnamomea*, 485, 490, 491, 493.  
*Bridelia Curtisii*, 489.  
*Bridelia Griffithii*, 485, 489, 491, 492, 494.  
*Bridelia Kuzii*, 489.  
*Bridelia lanceaefolia*, 488.  
*Bridelia lanceolata*, 488.  
*Bridelia Loureirii*, 488.  
*Bridelia minutiflora*, 493.  
*Bridelia ovata*, 485, 488.  
*Bridelia pedicellata*, 488.  
*Bridelia penangiana*, 485, 492, 494.

*Bridelia pustulata*, 485, 489.  
*Bridelia retusa*, 486.  
*Bridelia rhomnoides*, 488.  
*Bridelia scandens*, 487.  
*Bridelia stipularis*, 485.  
*Bridelia tomentosa*, 485, 487.  
*Bridelia Zollingeri*, 486.  
*Brugmansia*, 394.

## C

*Callaeocarpus sumatrana*, 461.  
*Champereia Griffithiana*, 277.  
*Camphora Chinensis*, 87.  
*Camphora Parthenoxylon*, 87.  
*Camphora pseudo-Sassafras*, 87.  
*Caryodaphne densiflora*, 39.  
*Casuarinaceæ*, 393, 405.  
*Casuarina*, 406.  
*Casuarina equisetifolia*, 406.  
*Cassytheæ*, 201.  
*Cassytha*, 201.  
*Cassytha filiformis*, 202.  
*Castanea acuminatissima*, 449.  
*Castanea costata*, 457.  
*Castanea f. furfurella*, 428.  
*Castanea gloimerata*, 461.  
*Castanea Hystrix*, 456.  
*Castanea inermis*, 461.  
*Castanea ? sessilifolia*, 449.  
*Castanea trisperma*, 457.  
*Castanea Tungurrut*, 464.  
*Castanopsis*, 453.  
*Castanopsis Andersoni*, 454, 458.  
*Castanopsis argentea*, 466.  
*Castanopsis costata*, 457.  
*Castanopsis costana*, 454, 456.  
*Castanopsis catappoeifolia*, 454, 457.  
*Castanopsis curtisii*, 454, 465.  
*Castanopsis fulva*, 454, 456.  
*Castanopsis Hwilettii*, 454, 459.  
*Castanopsis malaccensis*, 453, 455.  
*Castanopsis megacarpa*, 454, 462.  
*Castanopsis nephelioides*, 454, 464.  
*Castanopsis Ridleyi*, 463.  
*Castanopsis schefferiana*, 459.

*Castanopsis scorstechinii*, 453, 455.  
*Castanopsis sumatrana*, 454, 460.  
*Castanopsis Wallichii*, 454, 464.  
*Celosia*, 4, 6.  
*Celosia argentina*, 7.  
*Celosia margaritacea*, 7.  
*Celosia nodiflora*, 8.  
*Ceraminum tomentosum*, 26.  
*Chaetocarpus*, 476, 480, 483.  
*Chamissoa aspera*, 8.  
*Chamissoa dichotoma*, 8.  
*Chamissoa nodiflora*, 8.  
*Champereia*, 277.  
*Champereia Cumingia*, 278.  
*Chavica Betle*, 312.  
*Chavica sarmentosa*, 309.  
*Chiridium speciosum*, 353.  
*Chiridium verticillatum*, 353.  
*Chloranthaceæ*, 2, 33.  
*Chloranthus*, 33.  
*Chloranthus brachystachys*, 33, 34.  
*Chloranthus elatior*, 34.  
*Chloranthus electus*, 34.  
*Chloranthus monander*, 34.  
*Chloranthus officinalis*, 33.  
*Choriophyllum*, 473, 481, 482.  
*Cichlanthus ferrugineus*, 361.  
*Cinnamomeæ*, 71.  
*Cinnamomum*, 71.  
*Cinnamomum aureofulvum*, 73, 84.  
*Cinnamomum Burmanni*, 74.  
*Cinnamomum cinereum*, 73, 84.  
*Cinnamomum Deschampsii*, 73, 80.  
*Cinnamomum graciliflorum*, 71.  
*Cinnamomum Griffithii*, 77.  
*Cinnamomum iners*, 72, 76.  
*Cinnamomum inunctum*, 74, 85.  
*Cinnamomum javanicum*, 73, 81.  
*Cinnamomum lampongum*, 73, 79.  
*Cinnamomum ? malaccense*, 87.  
*Cinnamomum mollissimum*, 73, 82.  
*Cinnamomum Neesianum*, 87.  
*Cinnamomum Parthenoxylon*, 74, 86.  
*Cinnamomum pauciflorum*, 78.  
*Cinnamomum pseudo-Sassafras*, 87.

- Cinnamomum rhynocophyllum*, 73, 78.  
*Cinnamomum Ridleyi*, 72, 77.  
*Cinnamomum Scortechinii*, 73, 83.  
*Cinnamomum sulphuratum*, 82.  
*Cinnamomum vimineum*, 73, 80, 78.  
*Cinnamomum zeylanicum*, 72, 75.  
*Cladostachys frutescens*, 6.  
*Claoxylon*, 474, 481, 483.  
*Cleidion*, 475, 480, 482, 484.  
*Cleistanthus*, 472, 477.  
*Cleistanthus bracteosum*, 494, 497.  
*Cleistanthus Curtissi*, 501.  
*Cleistanthus dasyphyllus*, 506.  
*Cleistanthus decurrens*, 495, 507.  
*Cleistanthus ellipticus*, 496, 517.  
*Cleistanthus flavescens*, 495, 501, 504.  
*Cleistanthus glandulatus*, 502.  
*Cleistanthus glaucus*, 495, 499.  
*Cleistanthus glandulosus*, 495, 503.  
*Cleistanthus gracilis*, 495, 506.  
*Cleistanthus heterophyllum*, 495, 505.  
*Cleistanthus hirsutopetalus*, 495, 502.  
*Cleistanthus hirsutulus*, 496, 511.  
*Cleistanthus Kingii*, 496, 515.  
*Cleistanthus laevis*, 503.  
*Cleistanthus lanceolatus*, 488.  
*Cleistanthus lanuginosus*, 495, 510.  
*Cleistanthus macrophyllum*, 494, 495, 509.  
*Cleistanthus Maingayi*, 496, 513.  
*Cleistanthus malaccensis*, 495, 504.  
*Cleistanthus membranaceus*, 490, 495, 499, 500, 507, 511.  
*Cleistanthus myrianthus*, 496, 515.  
*Cleistanthus nitidus*, 500.  
*Cleistanthus parvifolius*, 495, 507.  
*Cleistanthus pedicellatus*, 494, 498.  
*Cleistanthus podocarpus*, 495, 503.  
*Cleistanthus polyphyllus*, 496, 512.  
*Cleistanthus praetermissus*, 496, 511.  
*Cleistanthus pseudo-myrianthus*, 496, 516.  
*Cleistanthus rufus*, 496, 517, 518.  
*Cleistanthus siamensis*, 495, 507.  
*Cleistanthus stipulatus*, 500.  
*Cleistanthus vestitus*, 496, 515.  
*Cluytieae*, 474.  
*Cluytia scandens*, 487.  
*Cluytia stipularis*, 486.  
*Coccoceras*, 475, 482, 484.  
*Coccoloba crispata*, 22.  
*Coccoloba indica*, 22.  
*Coelodispus*, 474, 475, 479, 481, 482, 484.  
*Coleobotrys crassise-pala*, 355.  
*Coleobotrys heterantha*, 354.  
**Convolvulaceae**, 1.  
*Croton*, 473, 478.  
*Crotoneae*, 473.  
*Cryphea erecta*, 34.  
**Cryptocaryae**, 35, 37.  
*Cryptocarya*, 37.  
*Cryptocarya acuminulata*, 42.  
*Cryptocarya areolata*, 38, 48.  
*Cryptocarya argentina*, 38, 51.  
*Cryptocarya bracteolata*, 38, 46.  
*Cryptocarya bubongana*, 38, 50.  
*Cryptocarya caesia*, 38, 49.  
*Cryptocarya crassinervia*, 38, 41.  
*Cryptocarya cuneata*, 65.  
*Cryptocarya densiflora*, 38, 39.  
*Cryptocarya enervis*, 38, 50.  
*Cryptocarya ferrea*, 38, 45, 49.  
*Cryptocarya ferruginea*, 187.  
*Cryptocarya glaucescens*, 45.  
*Cryptocarya griffithiana*, 38, 40.  
*Cryptocarya Griffithii*, var. *caudata*, 38, 41.  
*Cryptocarya impressa*, 38, 42.  
*Cryptocarya infectoria*, 41, var. *opaca*, 43.  
*Cryptocarya Kurzii*, 38, 48.  
*Cryptocarya Mentek*, 46.  
*Cryptocarya oblongifolia*, 46.  
*Cryptocarya obscura*, 46.  
*Cryptocarya tomentosa*, 38, 44.  
*Cryptocarya tomentosa*, var. *rugosa*, 45.  
*Cryptocarya rugulosa*, 38, 43.  
*Cryptocarya Scortechinii*, 38, 47.

*Cryptocarya Wightiana*, 49.  
*Cryptocarya Wrayi*, 38, 40.  
*Cubeba lanata*, 305.  
*Cubeba Lowong*, var. *quintuplinervis*, 305.  
*Cubeba sumatrana*, 323.  
*Cubeba Wallichii*, 322.  
*Cyanodaphne cuneata*, 65.  
*Cyanodaphne tomentosa*, 65.  
*Cyathula*, 11.  
*Cyathula geniculata*, 12.  
*Cyathula prostrata*, 12.  
*Cyathula repens*, 12.  
*Cyclobalanopsis argentana*, 409.  
*Cyclobalanopsis Merkusii*, 410.  
*Cyclobalanopsis turbinata*, 410.  
*Cyclobalanus Blumeana*, 445.  
*Cyclobalanus conocarpa*, 431.  
*Cyclobalanus costata*, 444.  
*Cyclobalanus encleistacarpa*, 450.  
*Cyclobalanus Ewycii*, 432.  
*Cyclobalanus Hystrix*, 429.  
*Cyclobalanus Lamponga*, 424.  
*Cyclobalanus Omalokas*, 440.  
*Cyclodiscus latifolius*, 26.  
*Cyclodiscus tomentosus*, 26.  
*Cylicodaphne*, 177.  
*Cylicodaphne ferruginea*, 187.  
*Cylicodaphne myristicoefolia*, 170.  
*Cylicodaphne noronhiana*, 180.  
*Cylicodaphne oblonga*, var. *Griffithii*, 170.  
*Cylicodaphne ochracea*, 166.  
*Cylicodaphne robusta*, 181.  
 Cytinaceæ, 393.

## D

*Dalechampia*, 474, 479.  
*Daphne composita*, 257.  
*Daphne viridiflora*, 259.  
*Daphnidium acuminatum*, 199.  
*Daphnidium bibracteatum*, 199.  
*Daphnidium coesium*, 200.  
*Daphnidium coesium*, 199.  
*Daphnidium oxyphyllum*, 197.  
*Daphniphyllum*, 473, 482, 483.  
*Deeringia*, 4, 5.

*Deeringia baccata*, 6.  
*Deeringia celosoides*, 5.  
*Deeringia indica*, 6.  
*Dehaasia*, 62.  
*Dehaasia cuneata*, 62, 64.  
*Dehaasia Curtisii*, 62, 65.  
*Dehaasia loncifolia*, 62, 66.  
*Dehaasia microcarpa*, 62.  
*Dehaasia nigrescens*, 62, 64.  
*Dehaasia squarrosa*, 63.  
*Dendrotrophe buxifolia*, 274.  
*Dendrophthoe coccineus*, 357.  
*Dendrophthoe farinosa*, 364.  
*Dendrophthoe ferruginea*, 361.  
*Dendrophthoe longiflorus*, 366.  
*Dendrophthoe macrocalyx*, 354.  
*Dendrophthoe ablectus*, 360.  
*Dendrophthoe pentandra*, 364.  
*Dendrophthoe pentapetala*, 356.  
*Dendrophthoe pulcher*, 353.  
*Dendrotrophe varians*, 271.  
*Dephne montana*, 258.  
*Dephne pendula*, 258.  
*Desmochæta atropurpurea*, 14.  
*Desmochæta patula*, 12.  
*Desmochæta prostrata*, 12.  
*Desmochæta repens*, 12.  
*Dimorphocalyx*, 474, 480.  
*Diplomorpha?* *viridiflora*, 259.  
*Drypetes*, 472, 480, 483.  
*Dyospyros?* *Acuminata*, 170.

## E

Elæagnaceæ, 205, 267.  
*Elæagnus*, Linn., 268.  
*Elæagnus conferta*, 269.  
*Elæagnus ferruginea*, 269.  
*Elaterospermum*, 479, 470, 473.  
*Elæagnus Kologa*, 269.  
*Elæagnus latifolia*, 268.  
*Elæagnus Thwaitesii*, 269.  
*Elæagnus Wallichiana*, 269.  
*Endiandra*, 67.  
*Endiandra?* *Candolliana*, 65.  
*Endiandra Kingiana*, 67, 68.  
*Endiandra Maingayi*, 67, 68.  
*Endiandra præclara*, 67, 69.



*Endiandra rubescens*, 70.  
*Endiandra Wrayi*, 68, 70.  
*Endospermum*, 476, 482, 483.  
*Engelhardtia*, 400.  
*Engelhardtia chrysolepis*, 403.  
*Engelhardtia nudiflora*, 400, 401.  
*Engelhardtia Roxburghiana*, 401, 403.  
*Engelhardtia spicata*, 400.  
*Engelhardtia Wallachiana*, 400, 402.  
*Enkleia*, 257, 262.  
*Enkleia malaccensis*, 262.  
*Enkleia malayana*, 263.  
*Elytranthe*, 349, 369.  
*Elytranthe albida*, 370, 371.  
*Elytranthe avenis*, 370, 374.  
*Elytranthe Barnesii*, 378.  
*Elytranthe Beccorii*, 382.  
*Elytranthe diantha*, 371, 379.  
*Elytranthe evenia*, 375.  
*Elytranthe farinosa*, 365.  
*Elytranthe formosa*, 370, 372.  
*Elytranthe Globosa*, 370, 377.  
*Elytranthe Globosa*, var. *Puberula*, 378.  
*Elytranthe Kunsferi*, 370, 373.  
*Elytranthe Lowii*, 370, 377.  
*Elytranthe Maingayi*, 370, 372.  
*Elytranthe papillosa*, 370, 375.  
*Elytranthe platyphylla*, 370, 374.  
*Elytranthe retusa*, 370, 376.  
*Elytranthe Robinsonii*, 370, 379.  
*Elytranthe Wrayi*, 371, 380.  
*Eriosolena montana*, 258.  
*Erismanthus*, 474, 478.  
*Epiprinus*, 475.  
*Euphorbiaceæ*, 469.  
*Euxolus caudatus*, 11.  
*Excoecaria*, 476, 479, 481, 482, 484.

## F

*Fagaceæ*, 393, 406.  
*Flaggea*, 524, 480, 482, 472.  
*Flaggea virosa*, 525.

## G

*Galearia*, 473, 480.  
*Gelcunium*, 482.  
*Gelonieæ*, 476.  
*Gelonium*, 483, 476.  
*Gesneraceæ*, 1.  
*Ginalloa*, 350, 383.  
*Ginalloa Siamica*, var. *Scortechinii*, 383.  
*Glabraria litoralis*, 132.  
*Glabraria tersa*, 132.  
*Glabraria vestita*, 133.  
*Glochidion*, 472, 477.  
*Gomphrena globosa*, 5.  
*Gomphrena sessilis*, 17.  
*Gonystylaceæ*, 205, 266.  
*Gymnacranthera*, 206, 222.  
*Gymnacranthera Farquhariana*, 223, 225.  
*Gymnacranthera Forbesii*, 223, 224.  
*Gymnacranthera Murtoni*, 223.  
*Gyrocarpus*, 203.

## H

*Haasia cuneata*, 65.  
*Haasia incrassata*, 63.  
*Haasia micocarpa*, 63.  
*Haasia peduncularis*, 89.  
*Heckeria subpeltata*, 338.  
*Helicia*, 340.  
*Helicia attenuata*, 340, 341.  
*Helicia castaneæfolia*, 345.  
*Helicia Curtisii*, 341, 348.  
*Helicia excelsa*, 341, 346.  
     var. *Forbesii*, 347.  
     var. *salicifolia*, 347.  
*Helicia javanica*, 345.  
*Helicia Kingiana*, 341, 343.  
*Helicia macrophylla*, 345.  
*Helicia petiolaris*, 340, 342.  
*Helicia robusta*, 341, 344.  
*Helicia rufescens*, 341, 345.  
*Helicia Scortechinii*, 341, 348.  
*Helicia velutina*, 341, 346.  
*Heliotropium javanicum*, 345.  
*Henslowia*, 269.

Henslowia, buxifolia, 270, 274.  
 Henslowia lobbiana, 270, 273.  
 Henslowia monticola, 270, 274.  
 Henslowia plurinervis? 270, 272.  
 Henslowia Ridleyi, 270.  
 Henslowia varians, 270, 271.  
 Henslowia Wrayi, 270, 272.  
 Hernandiaceæ, 2, 203.  
 Hernandia, 203, 205.  
 Hernandia peltata, 204.  
 Hernandia sonora, 204.  
 Hexapora Curtisi, 71.  
 Hippomanes, 476.  
 Homalanthus, 476, 479.  
 Homonoia, 476, 482, 484.  
 Horsfieldia, 206.  
 Horsfieldia amygdalina, 207, 214.  
 Horsfieldia brachiata, 207, 218.  
 Horsfieldia canarioides, 206, 208, 222.  
 Horsfieldia crassifolia, 207, 217.  
 Horsfieldia flocculosa, 206, 210.  
 Horsfieldia fulva., var. *paludicola*, 207, 210, 211.  
 Horsfieldia globularia, 206, 207.  
 Horsfieldia grandis, 207, 211.  
 Horsfieldia Irya, 207, 215.  
 Horsfieldia Lemanniana, 207, 219.  
 Horsfieldia majuscula, 207, 215.  
 Horsfieldia *Prainii*, 222.  
 Horsfieldia racemosa, 207, 222.  
 Horsfieldia Ridleyana, 207, 221.  
 Horsfieldia subglobosa, 207, 222.  
 Horsfieldia sucosa, 207, 217.  
 Horsfieldia superba, 206, 209.  
 Horsfieldia sylvestris, 222.  
 Horsfieldia tomentosa, 207, 212.  
 Horsfieldia Wallichii, 207, 213.  
 Hymenocardia, 473, 481, 483.

I

Illigera, 203.  
 Illigera appendiculata, 203.  
 Illigera lucida, 203.  
 Illigera pulchra, 203.  
 Illigera trifoliata, 203.

J

*Jatropha*, 473, 478.  
 Juglandaceæ, 393, 399.  
*Juglans pterococca*, 401, 403.

K

Kibara, 250, 253.  
*Kibara Blumei*, 255.  
 Kibara serrulata, var. *Blumei*, 256.  
 Kibara chartacea, 253, 254, 255.  
 Kibara coriacea, 253, 254, 255.  
 Kibara coriacea, var. *serrulata*, 253.  
 Kibara cuspidata, 253, 254.  
 Kibara serrulata, 256.  
 Korthalsella, 350, 384.  
 Korthalsella japonica, 384.  
 Knema, 206, 236.  
 Knema conferta, var. *Scortechinii*, 237, 243, 244, 245.  
 Knema Cantleyi, 236, 238.  
 Knema Curtisii, 236, 240.  
 Knema furfuracea, 237, 245.  
 Knema geminata, 237, 247.  
 K. Hookeriana, 236, 237.  
*Knema glaucesceus*, 243.  
 Knema intermedia, var. *dubia*, 236, 239, 240.  
 Knema Kunstleri, 236, 241.  
 Knema laurina, 237, 248.  
 Knema malayana, 236, 242.  
 Knema missionis, 237, 247.  
 Knema oblongifolia, var. *monticola*, 237, 246.  
 Knema retusa, 237, 249.  
 Knema Wrayi, 237, 243.  
 Kunstlera, 482, 475.

L

Labiatae, 1.  
*Lobbia dependens*, 28.  
*Lanthorus pentapetalus*, 356.  
 Lauraceæ, 2, 35.  
 Laureæ, 193.  
*Laurus acuminata*, 199.  
*Laurus bibracteata*, 199.

- Laurus Cinnamomum*, 76.  
*Laurus declinata*, 106.  
*Laurus glomerata*, 116.  
*Laurus grandis*, 109, 181.  
*Laurus involucrata*, 132.  
*Laurus lanceolata*, 105.  
*Laurus ligustrina*, 106.  
*Laurus malabathrum*, 77.  
*Laurus microphylla*, 199.  
*Laurus nitida*, 77.  
*Laurus Parthenoxylon*, 87.  
*Laurus peduncularis*, 89.  
*Laurus polyantha*, 198.  
*Laurus porrecta*, 87.  
*Laurus pruinosa*, 120.  
*Laurus pseudo-sarsafraz*, 87.  
**Leguminosæ**, 1.  
*Leiospermum ferrugineum*, 14.  
*Lepeostegeres*, 350, 381.  
*Lepeostegeres Beccarii*, 381.  
*Lepeostegeres Kingii*, 381, 382.  
*Lepidadenia ferruginea*, 187.  
*Lepidadenia Griffithii*, 170.  
*Lepidadenia magnifica*, var. *pahangensis*, 153.  
*Lepidadenia noronhiana*, 180.  
*Lepidadenia ochracea*, 166.  
*Lepidadenia robusta*, 181.  
*Lepidadenia Wightiana*, 177.  
*Losiosiphon scandens*, 263.  
*Lindera*, 193.  
*Lindera hibroctatea*, 194, 199.  
*Lindera coesia*, 194, 200.  
*Lindera malaccensis*, 194.  
*Lindera oxyphylla*, 194, 197.  
*Lindera pipericarpa*, 194, 198.  
*Lindera polyantha*, 194, 197.  
*Lindera rufa*, 194, 200.  
*Lindera Wrayi*, 194, 196.  
*Linostoma*, 252, 261.  
*Linostoma pauciflorum*, 261.  
*Linostoma scandens*, 263.  
*Linostoma siamense*, 263.  
*Lithocarpus scutigera*, 444.  
**Litseeæ**, 112.  
*Litsea*, 123.  
*Litsea amara*, 125, 140.  
 var. *fusco-tomentosa*, var. *angustata*, var. *attenuata*, 141, 142.  
*Litsea angulata*, 126, 149.  
*Litsea Blumii*, 188.  
*Litsea brachystachya*, 126, 148.  
*Litsea castanea*, 127, 155.  
*Litsea cauliflora*, 134.  
*Litsea chinensis*, 125, 131.  
*Litsea citrata*, 126, 146.  
*Litsea claviflora*, 129, 167.  
*Litsea cordata*, 126, 144.  
*Litsea Curtisii*, 129, 173.  
*Litsea cylindrocarpa*, 127, 157.  
*Litsea fenestrata*, 128, 162.  
*Litsea ferruginea*, 131, 186.  
*Litsea firma*, 125, 138.  
*Litsea Foxiana*, 128, 163.  
*Litsea gemelliflora*, 129, 268.  
*Litsea glabaris*, 132.  
*Litsea glabrata*, 149.  
*Litsea glomerata*, 116.  
*Litsea gracilipes*, 131, 184.  
*Litsea gracilis*, 125, 139.  
*Litsea grandis*, 125, 136.  
*Litsea Griffithii*, 131, 187.  
*Litsea Helferii*, var. *ovata*, 168.  
*Litsea hirsutissima*, var. *geniculata*, 143.  
*Litsea johorensis*, 125, 133.  
*Litsea Kunstbri*, 128, 167.  
*Litsea lancifolia*, 130, 182.  
*Litsea lancifolia*, var. *rufa*, 183.  
*Litsea laevis*, 132.  
*Litsea lucida*, 149.  
*Litsea machilifolia*, 129, 171.  
*Litsea macrophylla*, 114.  
*Litsea machilifolia*, var. *angustifolia*, 172.  
*Litsea magnifica*, 126, 152.  
*Litsea Maingayi*, 130, 178.  
*Litsea megacarpa*, 130, 175.  
*Litsea monopetala*, 144.  
*Litsea monticola*, 128, 164.  
*Litsea myristicæfolia*, 129, 169.  
*Litsea midularis*, 130, 174.  
*Litsea noronhæ*, 130, 179.  
*Litsea oblanceolata*, 128, 166.  
*Litsea Ochracea*, 128, 165.

*Litsea Panamonja*, 129, 172.  
*Litsea patellaris*, 128, 161.  
*Litsea penangiana*, 154.  
*Litsea perakensis*, 128, 160.  
*Litsea petiolata*, 126, 147.  
*Litsea platyphylla*, 132.  
*Litsea polyantha*, 126, 143.  
*Litsea pustulata*, 128, 161.  
*Litsea quercina*, 127, 156.  
*Litsea Ridleyi*, 127, 153.  
*Litsea Reinwardii*, 150.  
*Litsea robusta*, 130, 180.  
*Litsea sarawacensis*, 130, 182.  
*Litsea Scortechinii*, 128, 164.  
*Litsea seleifera*, 130, 176.  
*Litsea sebeifera*, 132.  
*Litsea sessiliflora*, 131, 185.  
*Litsea singaporensis*, 127, 159.  
*Litsea spathcea*, 126, 150.  
     *var. tomentosa*, 152.  
*Litsea tetranthera*, 132.  
*Litsea Teysmanni*, 129, 170.  
*Litsea tomentosa*, 125, 132.  
*Litsea trunciflora*, 125, 135.  
*Litsea ujongensis*, 131, 185.  
*Litsea ujongensis*, *var. nervosa*,  
     185.  
*Litsea Wrayi*, 127, 158.  
*Litsea villosa*, 192.  
*Litsea zeylanica*, 190.  
**Loranthaceæ**, 279, 349.  
**Loranthus**, 349, 350.  
*Loranthus albidus*, 371.  
*Loranthus ampullaceus*, 378.  
*Loranthus arenis*, 375.  
*Loranthus Beccarii*, 382.  
*Loranthus bicolor*, 366.  
*Loranthus carinatus*, 378.  
*Loranthus casuarinæ*, 351, 362.  
*Loranthus coccineus*, 351, 353, 356,  
     369.  
*Loranthus crassipetalus*, 351, 354.  
*Loranthus Duthieanus*, 352, 367.  
*Loranthus eleutheropetalus*, 354.  
*Loranthus estipitatus*, 351, 362.  
*Loranthus farinosus*, 364.  
*Loranthus ferrugineus*, 351, 360.  
*Loranthus globosus*, 378.

*Loranthus grandifrons*, 352, 366.  
*Loranthus crassus*, 352, 363.  
*Loranthus-heteranthus*, 351, 353.  
*Loranthus hypoglaucus*, 375.  
*Loranthus Kingii*, 383.  
*Loranthus Kunstleri*, 374.  
*Loranthus leucosphon*, 371.  
*Loranthus Lobbii*, 351, 358.  
*Loranthus longiflorus*, 352, 365.  
*Loranthus Loxantherus*, 369.  
*Loranthus maculatus*, 364.  
*Loranthus malaccensis*, 351, 361.  
*Loranthus oleifolius*, 378.  
*Loranthus obtectus*, 351, 359.  
*Loranthus oleoides*, 378.  
*Loranthus palleus*, 378.  
*Loranthus pentandrus*, 352, 364.  
*Loranthus pentapetalus*, 351, 355.  
*Loranthus perakensis*, 353.  
*Loranthus platyphyllus*, 374.  
*Loranthus productus*, 351, 357.  
*Loranthus pulcher*, 351, 352.  
*Loranthus Pulcher*, *var. Parishii*,  
     353.  
*Loranthus puniceus*, 353.  
*Loranthus raceneiferus*, 357.  
*Loranthus Reinwardtianus*, 369.  
*Loranthus retusus*, 364.  
*Loranthus rigidus*, *contractus* and  
     *finlaysonianus*, 364.  
*Loranthus retusus*, 376.  
*Loranthus scortechinii*, 352, 367.  
     *var. laevigata*, 360.  
     *var. obtecta*, 360.  
*Loranthus speciosus*, 353, 369.  
*Loranthus sphærocarpus*, 378.  
*Loranthus subglobosus*, 378.  
*Loranthus subumbellatus*, 378.  
*Loranthus venosus*, 364.  
*Loranthus viridiflorus*, 378.  
*Loxanthera*, 349, 368.  
*Loxanthera speciosa*, 369.  
*Loxanthera wightianus*, 366.

## M

**Macaranga**, 476, 482.  
**Machilus**, 102.

- Machilus incrassatus*, 63.  
*Machilus macrophylla*, 107.  
*Machilus peduncularis*, 89.  
*Machilus Scortechinii*, 102.  
*Machilus* Sp. 106.  
*Macrosolen evenias*, 375.  
*Macrosolen Kunstleri*, 374.  
*Macrosolen pallens*, 378.  
*Macrosolen retusus*, 376.  
*Mallothus*, 475, 482, 480, 481, 484.  
*Matthæa*, 250.  
*Matthæa colophylla*, 252.  
*Mathæa latifolia*, 251, 252.  
*Mathæa sancta*, 251, 252.  
*Megistostigma*, 478.  
**Melastomaceae**, 1.  
*Mercurialinæ*, 474.  
*Micrococca*, 474, 479.  
*Microdesmis*, 473, 483, 480.  
**Microporeæ**, 70.  
*Micropora*, 70.  
*Micropora Curtisii*, 71.  
*Miquelina evenia*, 375.  
**Monimiaceae**, 205, 250.  
*Muldera*, 293, 333.  
*Myrica*, 404.  
**Myricaceæ**, 393, 403.  
*Myrica æsculenta*, 404.  
*Myrica æsculenta*, var. *auriculata*, 405.  
*Myrica Farquhariana*, 405.  
*Myrica integrifolia*, 405.  
*Myrica Missionis*, 405.  
*Myrica Nagi* 405.  
*Myrica sapida*, 405.  
**Myristicaceæ**, 205, 213.  
*Myristica*, 206, 226, 241.  
*Myristica amygdalina* 214.  
*Myristica aromatica*, 234.  
*Myristica bivalvis*, 208.  
*Myristica bracteata*, 228.  
*Myristica calocarpa*, 231.  
*Myristica Candleyi*, 239.  
*Myristica cinnamomea*, 227, 232.  
*Myristica Collettiana*, 221.  
*Myristica conferta*, 244.  
*Myristica conarioides*, 209.  
*Myristica corticosa*, 243, 247.  
*Myristica corticosa*, var. *decipiens*, 240.  
*Myristica brachiata*, 219.  
*Myristica crassa* 227, 234.  
*Myristica crassifolia*, 218.  
*Myristica Curtisii*, 241.  
*Myristica miptica*, 227, 231.  
*Myristica euginiaefolia*, 225.  
*Myristica exaltata*, 216.  
*Myristica Farquhariana*, 223, 225.  
*Myristica ferruginea*, 224.  
*Myristica floribunda*, 214.  
*Myristica flocculosa*, 210.  
*Myristica Forbesii*, 224.  
*Myristica fragrans*, 227, 233.  
*Myristica fulva*, 210.  
*Myristica furfuracea*, 245.  
*Myristica geminata*, 248.  
*Myristica gigantea*, 227, 229.  
*Myristica glabra*, 221, 214.  
 var. *Sumatrana*, 221.  
*Myristica glaucescens*, 243, 247.  
*Myristica globularia*, 208, 221.  
*Myristica grandis*, 212.  
*Myristica Griffithii*, 226.  
*Myristica guatterifolia*, 227, 235.  
*Myristica Hookeriana*, 180.  
*Myristica Horsfieldia*, 213, 214, 218, 219.  
*Myristica ineris*, 227, 230.  
*Myristica intermedia*, 240.  
*Myristica Irya*, 216.  
*Myristica Irya* var. *crassifolia*, 218.  
*Myristica ileophylla*, 240.  
*Myristica javanica*, 216.  
*Myristica Kunstleri*, 242.  
*Myristica lanceolata*, 247.  
*Myristica laurina*, 249.  
*Myristica Lemannana*, 220.  
*Myristica longifolia*, 245.  
*Myristica Lowiana*, 227, 235.  
*Myristica Maingayi*, 227, 228.  
*M. majuscula*, 215.  
*Myristica malaccensis*, 227, 230.  
*Myristica maxima*, 227, 228.  
*Myristica micrantha*, 216.

*Myristica missonis*, 247.  
*Myristica moschata*, 234.  
*Myristica Murtoni*, 224.  
*Myristica officinalis*, 234.  
*Myristica oblongifolia*, 246.  
*Myristica pendulina*, 222.  
*Myristica polyspherula*, 219, 220.  
*Myristica racemosa*, 222.  
*Myristica retusa*, 249.  
*Myristica Ridbyana*, 222.  
*Myristica rubiginosa*, 212.  
*Myristica Scortechinii*, 244, 245.  
*Myristica spaerocarpa*, 216.  
*Myristica Sphaerula*, 247.  
*Myristica suavis*, 227, 232.  
*Myristica subglobosa*, 221.  
*Myristica Suberba*, 210.  
*Myristica sublancoolata*, 230.  
*Myristica sucosa*, 214, 217.  
*Myristica sp.*, 209.  
*Myristica sycocarpa*, 231.  
*Myristica sylvestris*, 222.  
*Myristica tomentosa*, 213, 249.  
*Myristica Vriesiana*, 216.  
*Myristica Wallichii*, 214.

## N

*Nanopetalum myrianthus*, 516.  
*Neolitsea*, 189.  
*Neolitsea Kedahensis*, 189, 193.  
*Neolitsea mollissima*, 189, 192.  
*Neolitsea vicilosa*, 189, 191.  
*Neolitsea zeylanica*, 189.  
*Nepenthaceæ*, 279.  
*Nepenthes*, 280.  
*Nepenthes albo-marginata*, 280, 281.  
*Nepenthes ampullaria*, 280.  
*Nepenthes distillatoria*, 288.  
*Nepenthes lævis*, 286.  
*Nepenthes fimbriata*, 288.  
*Nepenthes gracilis*, 280, 285.  
*Nepenthes gracilis*, var. *arenaria*, 286.  
*Nepenthes gracillima*, 280, 282.  
*Nepenthes Korthalsiana*, 286.  
*Nepenthes macrostachya*, 288.

*Nepenthes Macfarlanei*, 280, 284.  
*Nepenthes phyllamphora*, 280, 287.  
*Nepenthes pumila*, 283.  
*Nepenthes Rafflesiana*, 280, 286.  
*Nepenthes Reinwardtiana*, 280, 285.  
*Nepenthes Sanderiana*, 287.  
*Nepenthes Sanguinea*, 280, 283.  
*Nepenthes Singalana*, 280, 282.  
*Nepenthes Teysmanniana*, 282.  
*Nepenthes tomentella*, 282.  
*Nepenthes veitchii*, 284.  
*Nothaphæbe*, 96.  
*Nothaphæbe chartacea*, 98.  
*Nothaphæbe glabrescens*, var. *Kingiana*, 100.  
*Nothaphæbe Kingiana*, 97, 99.  
*Nothaphæbe panduriformis*, 97, 101.  
*Nothaphæbe ? petiolaris*, 92.  
*Nothaphæbe fruticosa*, 97, 98.  
*Nothaphæbe reticulata*, 97, 100.  
*Nothaphæbe umbellifera*, 97.  
*Notothixos*, 350, 390.  
*Notothixos Malayanus*, 390, 391.  
*Notothixos subaureus*, 390.  
*Nyctaginaceæ*, 2.

## O

*Ocotea declinata* Bl, 106.  
*Ocotea lanciolata*, 105.  
*Ocotea ligustrina*, 106.  
*Ocotea umbellifera*, 98.  
*Oleaceæ*, 277.  
*Opiliaceæ*, 277.  
*Ostodes*, 474, 478, 483, 480.  
*Osyris rotundata*, 274.

## P

*Parthenoxylon porrectum*, 87.  
*Parthenoxylon pruinatum*, 87.  
*Parthenoxylon pseudo-sassafras*, 87.  
*Pasania acuminatissima*, 416, 448.  
*Pasania Beccariana*, 416, 452.  
*Pasania Bennettii*, 414, 433.  
*Pasania Blumeana*, 415, 445.



- Pasania Cantleyana*, 414, 434.  
*Pasania Clementiana*, 415, 439.  
*Pasania confragosa*, 415, 446.  
*Pasania conocarpa*, 413, 430.  
*Pasania costata*, 415, 443.  
*Pasania Curtisii*, 413, 429, 439.  
*Pasania cyclophora*, 415, 442.  
*Pasania cyrtorhyncha*, 414, 432.  
*Pasania discocarpa*, 416, 447.  
*Pasania encleisacarpa*, 416, 449.  
*Pasania encleisacarpa*, var. *aperta*, 450.  
*Pasania Eichleri*, 414, 438.  
*Pasania Ewyckii*, 413, 431.  
*Pasania Ewyckii*, var. *latifolia*, 413, 432.  
*Pasania Falconeri*, 413, 422.  
*Pasania grandifrons*, 412, 421.  
*Pasania Hystrix*, 413, 428.  
*Pasania Hystrix*, var. *longispica*, 429.  
*Pasania Javensis*, 452.  
*Pasania Kingiana*, 412, 417.  
*Pasania Korthalsii*, 428.  
*Pasania Kunstleri*, 412, 419.  
*Pasania lampadaria*, 415, 444.  
*Pasania Lamponga*, 413, 423.  
*Pasania Lamponga*, var. *Ewyckio-*  
*des*, 425.  
*Pasania lappacea*, 412, 416.  
*Pasania lucida*, 415, 440.  
*Pasania Maingayii*, 416, 451.  
*Pasania*, 407, 411.  
*Pasania omalokas*, 415, 439.  
*Pasania Rassa*, 414, 436.  
*Pasania Rassa*, var. *lanuginosa*, 437.  
*Pasania Robinsonii*, 416, 450.  
*Pasania Scortechinii*, 412, 418.  
*Pasania spicata*, 412, 419.  
*Pasania spicata*, var. *gracilipes*, 421.  
*Pasania spicata*, var. *microcalyx*, 421.  
*Pasania sundaica*, 413, 426, 455.  
*Pasania Wallichiana*, 413, 425.  
*Pasania Wenzigiana*, 414, 435.  
*Pasania Wrayii*, 416, 446.  
*Peperomia*, 289.  
*Peperomia caudolleana*, 291.  
*Peperomia dindigulensis*, 289, 290.  
*Peperomia Heyneana*, 290.  
*Peperomia Kotana*, 290, 292.  
*Peperomia malaccensis*, 289, 291.  
*Peperomia Maxwelliana*, 289, 291.  
*Peperomia pellucida*, 290, 292.  
*Peperomia portulacoides*, 289, 291.  
*Peperomia sasmentosa*, 309.  
*Peperomia Thwaitesii*, 290.  
*Peperomia trifolium*, 291.  
*Peperomia Wrayi*, 289, 290.  
*Persea grandis*, 109.  
*Persea incrassata*, 63.  
*Persea macrophylla*, 107, 110.  
*Persea peduncularis*, 89.  
*Persea pseudo-sassafras*, 87.  
*Phoebe*, 103.  
*Phoebe attenuata*, 109.  
*Phoebe chartacea*, 98.  
*Phoebe cuneata*, 104, 109.  
*Phoebe declinata*, 104, 105.  
 var. *sericea*, 106.  
*Phoebe densiflora*, 109.  
*Phoebe elliptica*, 107.  
*Phoebe javanica*, 109.  
*Phoebe Kunstleri*, 104, 107.  
*Phoebe lanceolata*, 104.  
*Phoebe lanceolata*, var. *ligustrina*, 106.  
*Phoebe latifolia*, 87.  
*Phoebe lucida*, 109.  
*Phoebe macrophylla*, 104, 106.  
*Phoebe malaccensis*, 109.  
*Phoebe multiflora*, 110.  
*Phoebe opaca*, 104, 108.  
*Phoebe opaca*, var. *cuspidata*, 109.  
*Phoebe sumatrana*, 106.  
*Phoebe umbelliflora*, 98.  
*Phoebe Bennettianum*, 357.  
*Phaenicanthemum coccineus*, 357.  
*Phaenicanthemum pentapetalum*, 356.  
*Phyllamphora mirabilis*, 288.  
*Phyllanthodendron*, 477, 479, 472, 476, 484.

- Phyllanthus*, 472, 526.  
*Phyllanthus acutus*, 527.  
*Phyllanthus Emblica*, 527.  
*Phyllanthus maderaspatensis*, 527.  
*Phyllanthus pectinatus*, 526.  
*Pimeleodendron*, 481, 484.  
*Piperaceæ*, 205, 279, 288.  
*Piper*, 293.  
*Piper arborescens*, 28.  
*Piper argyrites*, 299, 333.  
*Piper auriculatum*, 304.  
*Piper Betle*, 295, 311.  
*Piper Betle*, var. *densum*, 312.  
*Piper bipedale*, 298, 326.  
*Piper birmanicum*, 302.  
*Piper boehmeriaefolium*, 305.  
*Piper boehmeriaefolium*, 294, 305.  
     var. *angustifolia*, 306.  
     var. *glabra*, 305.  
     var. *humilis*, 306.  
     var. *lanata*, 305.  
     var. *lanatum*, 295.  
*Piper caninum*, 296, 317.  
*Piper caninum*, var. *glabrum*, 296.  
*Piper clypeatum*, 299, 333.  
*Piper collinum*, 297, 324.  
*Piper conibaccum*, 294, 301.  
*Piper cubeba*, 305.  
*Piper curtisetiolum*, 298, 330.  
*Piper Curtisii*, 297, 319.  
*Piper dindingsanum*, 296, 317.  
*Piper erecteacaulis*, 298, 330.  
*Piper eucalyptolimbium*, 298, 330.  
*Piper febrifugum*, 295, 312.  
*Piper filipes*, 298, 328.  
*Piper firmum*, 334, 335.  
*Piper flavibaccum*, 294, 303.  
*Piper flavimarginatum*, 334, 335.  
*Piper flavispicum*, 296, 314.  
*Piper glandulosum*, 304.  
*Piper globulistigmum*, 293, 299.  
*Piper gymnocladum*, 284, 304.  
*Piper gymnophyllum*, 295, 307.  
*Piper Javanicum*, 305.  
*Piper kotanum*, 296, 316.  
*Piper Kunstleri*, 298, 329.  
*Piper lanatum*, 305.  
*Piper lanceolatum*, 304, 306.  
*Piper lappaceum*, 339.  
*Piper larutanum*, 297, 324.  
*Piper leptonema*, 296, 316.  
*Piper lonchites*, 305.  
*Piper lonchites*, 295, 306.  
*Piper longamentum*, 298, 331.  
*Piper longibracteum*, 297, 323.  
*Piper longicaule*, 296, 315.  
*Piper longum*, 295, 310.  
*Piper magnibaccum*, 294, 301.  
*Piper Maingayi*, 334, 336.  
*Piper malaccense*, 296, 318.  
*Piper miniatum*, 294, 303, 306.  
*Piper manillanum*, 333.  
*Piper Maxwellianum*, 297, 320.  
*Piper minutistigmum*, 295, 311.  
*Piper muricatum*, 297, 325.  
*Piper moluccanum*, 304.  
*Piper mucronatum*, 297, 323.  
*Piper muricatum*, forma *pilistipes*, 297.  
*Piper nigrantherum*, 298, 328.  
*Piper nigrum*, 296, 313.  
*Piper nigrum*, var. *subpeuninervis*, 314.  
*Piper obovantherum*, 299, 332.  
*Piper obtusissimum*, 333.  
*Piper ovalifolium*, 290.  
*Piper pachyphyllum*, 334, 337.  
*Piper paucistigmum*, 297, 320.  
*Piper pedicellosum*, 297, 321.  
*Piper pellucidum*, 292.  
*Piper penangense*, 294, 300.  
*Piper pentandrum*, 334.  
*Piper Polygynum*, 334, 337.  
*Piper porphyro-phyllum*, 296, 313.  
*Piper portulacoides*, 291.  
*Piper protractum*, 297, 326.  
*Piper puberulirameum*, 295, 307.  
*Piper ramipilum*, 294, 299.  
*Piper rarispicum*, 334, 336.  
*Piper ribesioides*, 297, 322.  
*Piper Ridleyi*, 298, 327.  
*Piper rostratum*, 302.  
*Piper rufibracteum*, 298, 329.  
*Piper rufispicum*, 294, 300.  
*Piper sarmentosum*, 295, 308.  
*Piper schizonephros*, 334, 337.

*Piper Scortechinii*, 295, 309.  
*Piper selangorense*, 296, 318.  
*Piper semangkoanum*, 294, 304.  
*Piper stylosum*, 294, 302.  
*Piper subalbicans*, 296, 319.  
*Piper subfragile*, 295, 310.  
*Piper subpeltatum*, 338.  
*Piper subrubrispicum*, 298, 331.  
*Piper subsessililimbum*, 298, 332.  
*Piper sumatranum*, 323.  
*Piper Umbellatum*, var. *subpeltatum*, 338.  
*Piper velutinervium*, 295, 308.  
*Piper xanthocarpum*, 297, 324.  
*Piper Zippelia*, 339.  
*Plukenetia*, 474, 479.  
*Polyadenia grandis*, 133, 137.  
*Polyadenia polyantha*, 198.  
**Polygonaceæ**, 2, 18.  
*Polygonum auriculatum*, 22.  
*Polygonum adenotrichum*, 22.  
*Polygonum barbatum*, 18, 20.  
*Polygonum chinense*, 18, 22.  
*Polygonum corymbosum*, 22.  
*Polygonum cymosum*, 22.  
*Polygonum Donii*, 21.  
*Polygonum flacidum*, 18, 21.  
*Polygonum glabratum*, 23.  
*Polygonum hispidum*, 20.  
*Polygonum Hornemannii*, 20.  
*Polygonum horridum*, 23.  
*Polygonum Hydropiper*, 18, 21.  
*Polygonum hypostictum*, 20.  
*Polygonum minus*, 18, 19.  
*Polygonum mite* ? 21.  
*Polygonum muricatum*, 23.  
*Polygonum ocreatum*, 19.  
*Polygonum patens*, 22.  
*Polygonum pedunculare*, 18, 23.  
*Polygonum polycephalum*, 22.  
*Polygonum Posumbu*, 20.  
*Polygonum pulchrum*, 19.  
*Polygonum rivulare*, 20.  
*Polygonum sagittatum*, 23.  
*Polygonum strictum*, 20.  
*Polygonum strigosum*, 18, 22.  
*Polygonum tenellum*, 20, 21.  
*Polygonum tomentosum*, 18, 19.

*Potomorphe subpeltata*, 338.  
**Proteaceæ**, 279, 339.  
*Psilea dalbergioides*, 262.  
*Psilotrichum*, 14.  
*Psilotrichum trichotomum*, 14.  
*Ptilotus trichotomus*, 14.  
*Ptychopysis*, 475, 479, 481, 484.  
*Pupalia*, 13.  
*Pupalia atropurpurea*, 13.

## Q

**Quercus**, L., 407, 408.  
*Quercus anceps*, 421.  
*Quercus Arcaula*, 420.  
*Quercus Arcaula*, var. *macrocalyx*, 421.  
*Quercus argentana*, 408.  
*Quercus Beccariana*, 453.  
*Quercus Bennetii*, 434.  
*Quercus Blumeana*, 445.  
*Quercus brevipetiolata*, 424.  
*Quercus Cantleyana*, 435.  
*Quercus Clementiana*, 439.  
*Quercus conocarpa*, 431.  
*Quercus confragosa*, 446.  
*Quercus costata*, 444.  
*Quercus cyclophora*, 442.  
*Quercus cyrtorhyncha*, 433.  
*Quercus depressa*, 421, 442.  
*Quercus Dielpenhorstii*, 436.  
*Quercus discocarpa*, 448.  
*Quercus Eichleri*, 438.  
*Quercus elegans*, 420.  
*Quercus enclisacarpa*, 450.  
*Quercus Euryckii*, 432.  
*Quercus Falconcri*, 423.  
*Quercus glaberrima*, 421.  
*Quercus glomerata*, 461.  
*Quercus gracilipes*, 421.  
*Quercus grandifolia*, 420.  
*Quercus grandifrons*, 422.  
*Quercus hirsuta*, 417.  
*Quercus Horsfieldii*, 410.  
*Quercus Hystrix*, 428.  
*Quercus Junghuhnii*, 449.  
*Quercus Korthalsii*, var. *mappacea*, 427.

- Quercus Korthalsii*, var. *Hystrix*, 428.  
*Quercus Kunstleri*, 419.  
*Quercus Lamponga*, 424.  
*Quercus lappacea*, 417.  
*Quercus lineata*, 449.  
 var. *Merkusii*, 410.  
*Quercus literalis*, 421.  
*Quercus lucida*, 441.  
*Quercus Mackiana*, 417.  
*Quercus mappacea*, 427.  
*Quercus Merkusii*, 410.  
*Quercus microcalyx*, 421.  
*Quercus minor*, 423.  
*Quercus Miquelii*, 434.  
*Quercus Maingayii*, 452.  
*Quercus muricata*, 427.  
*Quercus oideocarpa*, 408, 409.  
*Quercus Omalkos*, 440.  
*Quercus placentaria*, 421, 442.  
*Quercus penangensis*, 442.  
*Quercus pseudomolucca*, 427.  
 var. *Korthalsii*, 427.  
 var. *sundaica*, 427.  
*Quercus pyrifolia*, 420.  
*Quercus racemosa*, 421.  
*Quercus Rassa*, 437.  
*Quercus Rhienensis*, 421.  
*Quercus sphacelata*, 421.  
*Quercus spicata*, 420.  
*Quercus sundaica*, 427.  
*Quercus squamata*, 420.  
*Quercus Thomsoni*, 421.  
*Quercus turbinata*, var. *crassilammetata*, 410.  
*Quercus turbinata*, 408, 410, 421.  
*Quercus umbonata*, 443.  
*Quercus Wallichiana*, 426.  
*Quercus Wenzigiana*, 436.  
*Quercus Wrayii*, 447.

## R

- Rofflesia*, 393.  
*Rafflesia cantybi*, 394.  
*Rafflesia Hasseltii*, 394.  
*Rafflesia Hasseltii*, 394.  
*Rhopala attenuata*, 342.

- Rhopala excelsa*, 347.  
*Rhopala glabrata*, 345.  
*Rhopala moluccana*, 342, 343.  
*Rhopala racemosa*, 342.  
*Rhopala robusta*, 345.  
*Rhopalocnemis*, 395, 398.  
*Rhopalocnemis phalloides*, 399.  
*Rhopalocnemis ruficeps*, 399.  
*Ricininae* 476, 479.

## S

- Salix*, 467.  
*Salix disperma*, 468.  
*Salix Horsfieldiana*, 468.  
*Salix letrasperma*, 467.  
*S. Santalaceae*, 205, 269.  
*Sapium*, 476, 479.  
*Sarcandra chloranthoides*, 34.  
*Sassapras Parthenoxylon*, 87.  
*Sauropus* 472, 477.  
*Scleropyrum*, 275, 269.  
*Scleropyrum*, Maingayi, 275, 276.  
*Scleropyrum Ridleyi*, 275, 276.  
*Scopolia composita*, 258.  
*Scrophulariaceae*, 1.  
*Scortechinia*, 473, 480, 483.  
*Scurrula pentandra*, G. Don., 365.  
*Sebastiania*, 476, 480.  
*Silicaceae*, 466.  
*Solanaceae*, 1.  
*Sonerila*, 1.  
*Stegastrum Beccarii*, 382.  
*Stemmatodaphne*, 110.  
*Stemmatodaphne*, perakensis, 111.  
*Strakcea melastomaeifolia*, 25.

## T

- Telanthra ficoidea*, 4.  
*Tetradenia foliosa*, 190.  
*Tetradenia furfuracea*, 190.  
*Tetradenia Zeylanica*, 190.  
*Tetranthera alnoides*, 144.  
*Tetranthera amara*, 140.  
*Tetranthera angulata*, 150.  
*Tetranthera angusta*, 142.  
*Tetranthera apetala*, 132.

*Tetranthera attenuata*, 183.  
*Tetranthera Blunei*, 187.  
*Tetranthera brachystachya*, 149.  
*Tetranthera Calophylla*, 177.  
*Tetranthera capitulata*, 170.  
*Tetranthera chrysantha*, 183.  
*Tetranthera citrata*, 147.  
*Tetranthera cordata*, 146.  
*Tetranthera cordifolia*, 146.  
*Tetranthera firma*, 138.  
*Tetranthera fruticosa*, 140.  
*Tetranthera geminata*, 132.  
*Tetranthera glabraria*, 132.  
*Tetranthera grandis*, 137.  
*Tetranthera hexantha*, 144.  
*Tetranthera lancifolia*, 132, 183.  
*Tetranthera litoralis*, 132.  
*Tetranthera laevis*, 132.  
*Tetranthera lucida*, 149.  
*Tetranthera macrophylla*, 144.  
*Tetranthera monopetala*, 144.  
*Tetranthera myristicifolia*, 169.  
*Tetranthera oxyphylla*, 197.  
*Tetranthera Panamonja*, 173.  
*Tetranthera polyantha*, 147.  
*Tetranthera pseudo-angulata*, 150.  
*Tetranthera pusilla*, 183.  
*Tetranthera robusta*, 181.  
*Tetranthera Roxburghii*, 132, 177.  
*Tetranthera rubra*, 180.  
*Tetranthera tomentosa*, 132.  
*Tetranthera vestita*, 133.  
*Thottea*, 24, 26.  
*Thottea dependens*, 27, 28.  
*Thottea grandiflora*, 27.  
*Thottea tricornis*, 29.  
 Thymelæaceæ, 205, 256.  
 Tiliaceæ, 205.  
*Tomen sebifera*, 132.  
*Trigonopleure*, 474, 478, 480.  
*Trigonostemon*, 474, 478.

## V

*Viscum*, 350, 385.  
*Viscum aphyllum*, 389.  
*Viscum-opuntia*, 384, 385, 389, 388.  
*Viscum Opuntioides*, 388.  
*Viscum articulatum*, 384, 385, 388, 389.  
*Viscum articulatum*, var. *dichotomum*, 388.  
*Viscum cengalense*, 386.  
*Viscum confertum*, 386.  
*Viscum compressum*, 389.  
*Viscum dichotomum*, 385, 388.  
*Viscum elongatum*, 388.  
*Viscum falcatum*, 386.  
*Viscum flexuosum*, 386, 389.  
*Viscum japonicum*, 384.  
*Viscum moniliforme*, 385.  
*Viscum monoicum*, 385, 386.  
*Viscum obtusatum*, 387.  
*Viscum orientale*, 385, 386.  
*Viscum orientale*, var. *ovalifolium*, 387.  
*Viscum subaureum*, 391.  
*Viscum verticillatum*, 387.  
*Viscum Wightianum*, 385.  
*Viscum Wrayi*, 385, 387.

## W

*Wikstrœmia*, 257, 258.  
*Winkstrœmia*, *Candolleana*, 259.  
*Wikstrœmia indica*, 259.  
*Wikstrœmia indica*, var. *viridiflora*, 259.  
*Wikstrœmia Ridleyi*, 250, 260.  
*Wikstrœmia viridiflora*, 259.

## Z

*Zippelia begoniæfolia*, 339.  
*Zippelia lappacea*, 339.